WORLD OIL

Established 1916 as The OIL WEEKLY®

RAY L. DUDLEY, *President, Publisher*
A. L. BURNS, *General Manager*
WARREN L. BAKER, *Editorial Director*

EDITORIAL STAFF

WARREN L. BAKER, *Editor*
AL REESE, *Managing Editor*
L. J. LOGAN, *Associate Editor*
CECIL W. SMITH, *Statistical Editor*
J. E. KASTROP, *Production Editor*
W. B. COLVIN, *Drilling Editor*
DONALD M. TAYLOR, *Pipe Line Editor*
DON KLIEWER, *International Editor*
WALLACE FITZGERALD, *Assistant to Managing Editor*

DISTRICT EDITORS

ROBERT E. SPANN, 250 Park Ave., New York 17, N. Y.
GILBERT M. WILSON, W. W. Wilson Bldg., Huntington Park, Calif.
ANTHONY GIBBON, Hunt Bldg., Tulsa 3, Okla.
ALICE L. GIVEN
MARION DENNARD RUTH THOMPSON
Editorial Assistants
MARY A. ZUBER, *Librarian*

ADVERTISING STAFF

TOM W. NELSON, *Advertising Manager*
ROGER MOTHERAL, *Eastern Advertising Manager*
250 Park Ave., New York 17, N. Y.
NELSON BIGELOW, 250 Park Ave., New York 17, N. Y.
BILL WESTFALL, 1010 Euclid Ave., Cleveland 15, Ohio
H. G. FITZPATRICK MARTIN HALLORAN
332 S. Michigan Ave., Chicago 14, Ill.
BILL ATCHESON, Hunt Bldg., Tulsa 3, Okla.
J. W. CURTS, W. W. Wilson Bldg., Huntington Park, Calif.
CHARLES WYATT DOUG CRAIG
3301 Buffalo Drive, Houston 6, Texas

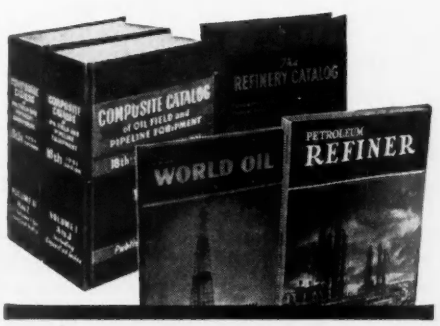
CIRCULATION DEPARTMENT

R. M. DE SOMBRE, *Manager*

Single copies 50 cents (except special issues). Subscription price: domestic and foreign, $2 a year; 2 years, $3; 3 years, $4. WORLD OIL, published every month except semi-monthly in February and July. Entered as *The Oil Weekly* as second class mail matter December 23, 1916, at the post office at Houston, Texas, under the act of March 3, 1879. Advertising rates on application.

Copyright, 1952, by The Gulf Publishing Company.

Indexed by Industrial Arts Index and Engineering Index



Specialized Oil Publications of
THE GULF PUBLISHING COMPANY
3301 Buffalo Drive, Houston 6, Texas
Box 2608, Houston 1, Texas

WORLD OIL and The COMPOSITE CATALOG
for the drilling-producing-pipe line industry

PETROLEUM REFINER and The REFINERY CATALOG
for the refining-natural gasoline industry

Next Month:

The Gulf Coast Issue!

CONTENTS

May, 1952 **Vol. 134, No. 6**

CURRENT OUTLOOK SECTION

Looking Ahead ... 35
Editor's Page — Warren L. Baker ... 37
The Changing Panorama ... 39
Report from the Observatory — Ray L. Dudley and Warren L. Baker ... 40
Petroleum Trends in U. S. — Cecil W. Smith ... 42
Monthly News Analysis ... 45
The Month's Completions ... 48
Competition Keen Among Refiners ... 50
Reports Show Who Drills Wells ... 55
U. S. Oil Produced by Many Firms — L. J. Logan ... 60
Storage Project to Save Steel — Anthony Gibbon ... 62
Naval Reserves Important — Capt. R. H. Meade ... 66

EXPLORATION SECTION

Utah's Oil Outlook Brightens — E. J. Eardley ... 73
Broad Training Essential for Subsurface Geologists ... 76
Thermal Differential Curves Reflect Subsurface Geology — Florent H. Bailly ... 77
Discovery in Oklahoma Opens Potential Reef Play — Anthony Gibbon ... 80
Exploration 20 Percent Above 1951 Record — Cecil W. Smith ... 86
U. S. Oil, Distillate and Gas Discoveries and Extensions in March ... 89

DRILLING SECTION

Mill Rejects Pass Tests — H. G. Texter ... 99
Penrod Completes New Drill Barge — W. B. Colvin ... 104
Remote Cathead Control Safe and Convenient ... 106
Simplified Rigup with Permanent Driller Lines ... 107
WORLD OIL Graphics: Wire Line and Casing Care ... 108
Minimizing Oil Well Cementing Failures — George B. Mangold ... 112
Fire Extinguished in Fifty Seconds ... 116
Contractor's Cost Clinic: Blowout Preventer Handled Safely — Gilbert M. Wilson ... 118
Effect of Calcium Sulfate on Properties of a Bentonite Suspension (Second of Two Parts.) — W. E. Bergman ... 122
How to Do It—Drilling Hints ... 134

PRODUCTION SECTION

Application of Gas Lift to Everyday Production Problems (First of Two Parts) — E. D. McMurry ... 151
Brine Disposed at Small Cost — J. E. Kastrop ... 162
Flooding Ups Limestone Production — M. H. Durbrow, H. L. Temple and W. E. Landrum ... 166
Flowmeter for Water Injectivity Profiling — Dr. R. G. Piety and B. F. Wiley ... 176
Drill-Stem Testing Methods Move Ahead — J. E. Smith ... 182
How to Do It—Production Hints ... 190

PIPE LINE SECTION

TGT Tie-In Piping Is Flexible and Safe ... 203
Holiday Repaired 12 Feet Under Water — O. W. Fowler ... 212
Analysis and Design of Unsupported Spans — Philip E. Reynolds ... 216
Four-Point Engine Control Saves Operating Expense — Harold L. Johns ... 226
Meet Samson — Carl I. Huss ... 232
Pipe Line Construction ... 236
How to Do It—Pipe Line Hints ... 238

INTERNATIONAL SECTION

More German Crude — Alfred M. Stahmer ... 245
New Line to Hike Indonesia Output — Robert E. Spann ... 248
Petroleum for Power in Red Europe — Jan Wszelaki ... 252
Export of Canadian Gas Approved ... 256
Dhahran Stabilizing Plant Stretched — Don Kliewer ... 258
Kingdoms of Oil: Smackover, Ark. — Anthony Gibbon ... 260
Oil in Russia (Part 3) — Dr. Leonid Smirnov ... 264
Iran Producing 32,000 Barrels Daily ... 268

SUPPLIERS' FEATURE

Jarecki Marks 100th Anniversary — Wallace Fitzgerald ... 270

• SPECIAL EQUIPMENT PROGRESS SECTION •

Better Tools Mean More Oil ... 287
Equipment Progress Section Reader Service Postcards ... 303
For More Information on Products Advertised ... 354
Reader Service Postcards for Advertised Products ... 355
New Catalogs and Equipment Literature in Advertisements ... 357

DEPARTMENTS

Advertisers' Index ... 2
The Oil Man's Calendar ... 32
Men in the Industry News ... 384
Associations ... 390
Equipment and Service Suppliers' Notes ... 393
Trading Post (Classified Advertising) ... 398
New Books, Maps and Movies ... 399
Squeaks from the Bull Wheel ... 400

ADVERTISERS' INDEX

*Asterisk preceding name of advertiser indicates that detailed data on products and services of the firm will be found in current 18th (1951) edition of The Composite Catalog of Oil Field and Pipe Line Equipment.

A

*A-1 Bit & Tool Co. 63
Abrams Aerial Survey Corp. 96
*Acme Fishing Tool Co. 393
*Advance Oil Tool Co. 192
Aero Service Corp. 255
*Aetna Ball and Roller Bearing Co. 319
*Ajax Iron Works 269
*Allied Chemical & Dye Corp. 227
*Allis-Chalmers Manufacturing Co. 88
*Alten Foundry & Machine Works, Inc. 195
*American Cable Division
American Chain & Cable Co. 313
*American Iron & Machine Works Co. 277
*American Manufacturing Co. of Texas 11
American Meter Co. 222-223
*American Sand-Banum Co. 140
American Steel & Wire Division
United States Steel Co. 16-17
*Axelson Manufacturing Co. 153

B

*B & W Incorporated 138
*Baash-Ross Tool Co. 257
Hotel Baker 237
*Baker Oil Tools, Inc. ..... 38 and 250-251
*Baroid Sales Division
National Lead Co. 244
*The Barrett Division
Allied Chemicals & Dye Corp. 227
The J. B. Beaird Co. 191
*Beaumont Iron Works Co. 165
*Beaver Pipe Tools, Inc. 237
*Bethlehem Steel Co. ..... 117 and 125
*Bethlehem Supply Co. 175
*Big Four Machine & Supply Co. 196
*Black, Sivalls & Bryson, Inc. ..... 311 and 335
*S. R. Bowen Co. 372
*Bowen Company of Texas 23
*Bucyrus-Erie Co. ..... 87 and 267
*The Buda Co. 341
Burch Agate Torpedo Co. 200
Butler Manufacturing Co. 197
*Byron Jackson Co. 79

C

Cable & Staples 382
*Cameron Iron Works, Inc. ..... 72 and 98
*Cardwell Manufacturing Co. 110-111
*Catawissa Valve & Fittings Co. 239
Caterpillar Tractor Co. 209
*The Cavins Co. 192
Chicago & Southern Air Lines 369
*Chicago Pneumatic Tool Co. 25
*Chiksan Co. 47
*Christensen Diamond Products Co. 129
Chrysler Corp. 160-161
*Clark Bros. Co. 230-231
Columbia-Geneva Steel Division
United States Steel Co. 16-17
The Continental Supply Co. ..... 131-132 and 337-338
*Fred E. Cooper, Inc. 315
*The Cooper-Bessemer Corp. 345
Core Laboratories, Inc. 141
*Crane Co. 4
Crouse-Hinds Co. 221
*Cummins Engine Co. 207
W. H. Curtin & Co. 282

D

*Detroit Diesel Engine Division
General Motors Corp. 363
Diamond Bit Co. 85
Diamond Chain Co. 20
Dowell Incorporated 36
Dresser Industries, Inc. ..... 230-231, 329 and 373
*Drilling & Service, Inc. 119
Drilling Specialties Co. 84
*Dynamatic Corp. 14

E

E-I-M Company 229
The Eagle-Picher Co. 399
E. H. Edwards Co. 283
*Emsco Derrick & Equipment Co. 337-338

F

*Fairbanks, Morse & Co. ..... 199 and 347
First National Bank in Houston 372
*Fluid Packed Pump Co. 167-168
*Foster Cathead Co. 92
*Fuller Co. 343

G

*Gardner-Denver Co. 131
*Garrett Oil Tools, Inc. 159
*Gaso Pump & Burner Mfg. Co. 201
*General Motors Corp. ..... 297 and 363
Geological Logging Co. 148
Geological Well Service Co. 404
The Geolograph Co. 147
Geophysical Survey Syndicate 361
The B. F. Goodrich Co. 9
*H. P. Gott Manufacturing Co. 282
*Great Lakes Corp. 353
*Grove Regulator Co. 65
*The Guiberson Corp. 321

H

*Halliburton Oil Well
Cementing Co. ..... 44, 71 and 307
*Harbison-Fischer Mfg. Co. 385
Heldt Bros. Trucks 144
*Hercules Tool Co. 404
Hinderliter Tool Company Division
H. K. Porter Co. 401
*Hobbs Manufacturing Co. 388
Houston Contracting Co. 237
Houston Laboratories 404
*Houston Ready-Cut House Co. 383
*Hughes Tool Co. ..... 243 and IV Cover
*Hutchison Manufacturing Co. 142
Hyatt Bearings Division
General Motors Corp. 297

I

*International Harvester Co. 323
The International Nickel Co. ..... 30 and 171
International Petroleum Exposition 82-83
Interstate Bedding Co. 395

J

Jarecki International Supply Division
H. K. Porter Co. 272-273
*Jefferson Union Co. 386
*Jensen Brothers Mfg. Co. 198
*Johnson-Fagg Engineering Co. 381
*Johnston Testers, Inc. 143
*The S. M. Jones Co. 187
*Justrite Manufacturing Co. 361

K

K & G Oil Tool & Service Co. 327
Kaiser Steel Corp. 225
Kelley Manufacturing Co. 396
Kimray, Inc. 194
*King Oil Tools 94
*Kinzbach Tool Co. 375

L

*L & H Machine Works 144
Lakewood Hotel 390
Lambert Corp. 282
*Lane-Wells
Company ..... 49, 249, 309, 402, and III Cover
*Larkin Packer Co. 150
*The Thomas Laughlin Co. 365
Lawn Hotel 390
*The Layne and Bowler Co. 18
*LeBus International Engineers Limited 333
*LeGrand, Sutcliff & Gell, Ltd. 370
*Le Roi Co. 58- 59
A. Leschen & Sons Rope Co. 371
Levingston Shipbuilding Co. 145
*Link-Belt Co. 3
Loma Alto Hotel 390
*Lone Star Tool Co. 146
*Lucey Export Corp. 351
*Lufkin Foundry & Machine Co. 181
Lynn Hotel 390

M

Macwhyte Co. 5
*Magnet Cove Barium Corp. 121
*Jas. P. Marsh Corp. 299
*John N. Martin, Manufacturer 147
*Martin-Decker Corp. 374
The Mayo Hotel 242
*McCullough Tool Co. 403
*McEvoy Co. 349
*McKissick Products Corp. 389
*Mid-Continent Supply Co. ..... 325 and 402
*Miller Sand Pump Co. 186
*Mission Manufacturing Co. ..... 127 and 172-173
*Lee C. Moore Corp. 115

N

*National Lead Co. 244
*The National Supply Co. 51-52-53-54
*National Tank Co. 155
N. L. Naylor 391
*New York Belting & Packing Co. 132
*W. C. Norris, Manufacturer, Inc. 41

O

*Walter O'Bannon Co. 400
*Oil Center Tool Co. ..... II Cover and 284
*Oil Well Manufacturing Corp. 392
*Oil Well Supply Division
United States Steel Co. 8
*D. W. Onan & Sons, Inc. 140
*Otis Pressure Control, Inc. 189

P

Pacific Coast Borax Co. 188
*Pacific Pumps, Inc. 373
*Page Oil Tools, Inc. 397
*Parkersburg Machine Co. 404
*The Parkersburg Rig & Reel Co. 301
*The Pelton Water Wheel Co. 185
*Perforating Guns Atlas Corp. 358
Petroleum Distributing Co. 384
Petroleum Electric Power Association 157
Pittsburgh Coke & Chemical Co. 241
Hotel Pittsburgher 233
H. K. Porter Co. ..... 272-273 and 401

R

*J. P. Ratigan, Inc. 28
*Rector Well Equipment Co. 331
*Rectorseal 382
*Reda Pump Co. 200
*Reed Roller Bit Co. ..... 33 and 281
Republic National Bank of Dallas 12
*Republic Steel Corp. 24
*The Ridge Tool Co. 377
Rinehart & Co. 29
*Rockwell Manufacturing Co. ..... I Cover and 69
*John A. Roebling's Sons Co. 31
*Rollway Bearing Co. 93
*Rolo Manufacturing Co. 400
The Royal Bank of Canada 380

S

*S & R Tool & Supply Co. 367
*Schlumberger Well Surveying Corp. 286
The Second National Bank of Houston 26
*Security Engineering Co. 329
Seismograph Service Corp. 75
*Shaffer Tool Works 317
Sheffield Steel Corp. 215
Shell Oil Co. 29
The William E. Sievers Corp. 147
A. O. Smith Corp. 235
Southern Engine & Pump Co. 233
*Southern Mill & Manufacturing Co. 22
*Spang & Co. 27
*Spencer-Safford Loadcraft, Inc. 219
Standard Oil Company of California 91
*Standco Brake Lining Co. ..... 367 and 404
*Sunshine Iron Works 376

T

Taylor-Woodrow (Building Exports) Ltd. 15
*Technical Oil Tool Corp. 97
*Templeton, Kenly & Co. 144
Texas Acidizers, Inc. 361
The Texas Co. 10
Texas Electric Steel Casting Co. 285
Texas Employers Insurance Assoc. 379
*Texas Flange Co. 387
*The Thermoid Co. 135
*Thompson Tool Co. 139
*Thornhill-Craver Co. 279
The Torrington Co. 67
Trading Post 398
*Tretolite Co. 149
*Tuboscope Co. 193

U

*Union Wire Rope Corp. 136-137
*Unit Rig & Equipment Co. 21
United Geophysical Co. 123
United States Steel Co. ..... 8, 16-17 and 34
United States Steel Export Co. 16- 17
*Universal Atlas Cement Co. 34
University of Oklahoma Press 240

V

Varner Co. 368
*Victaulic Company of America 32
*Visco Products Co. 7
J. H. H. Voss Co. 242

W

*W-K-M Company, Inc. 211
*Walker-Neer Machine Co. 95
Warren Automatic Tool Co. 138
*Waukesha Motor Co. 6
Waukesha Sales & Service Co. 275
Welex Jet Services, Inc. 109
*Well Equipment Mfg. Corp. 19
Williams Brothers 242
*Wilson Foundry & Supply Co. 367
*Wilson Manufacturing Co. 103
*Wilson Supply Co. 13
*Wisconsin Motor Corp. 378
*Worthington Corp. 178-179

Y

*Yale Machine Co. 233
The Youngstown Sheet & Tube Co. 202

Looking Ahead

U. S. DRILLING ACTIVITY is well on its way to a banner year, with prospects of exceeding first-of-the-year forecasts. Completion of 1259 more wells during the first three months of this year than in the same period of time last year indicates the peak of 44,826 wells finished in 1951 will be exceeded by a substantial margin.

A GREATER EFFORT will be made during coming months to obtain Office of Price Stabilization sanction for higher petroleum prices. While the whole petroleum price picture will be aired thoroughly, especially strong efforts will be made to obtain increased prices on California crudes and East Coast heating oils.

CURRENT OVERSUPPLY of petroleum product inventories, particularly in the Midwest region, should not deter Petroleum Administration for Defense's 18-month expansion program for the oil industry. Producing and refinery levels will remain at too high levels to leave sufficient surplus capacity.

GROWTH IN GASOLINE DEMAND during 1952 will not be as large as in either 1950 or 1951. This is indicated by the first three months, when demand averaged 7.1 percent above last year while preliminary data for March indicate consumption was only 4 percent over March, 1951.

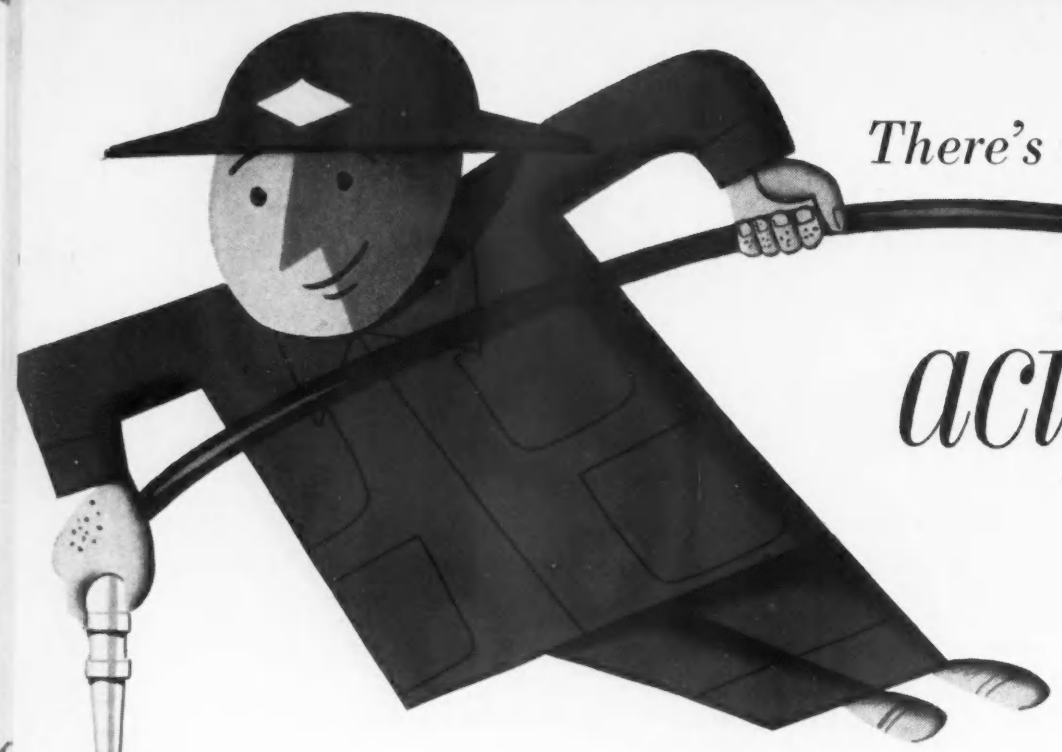
GREATEST PIPE LINE CONSTRUCTION year in history is predicted for 1952 by John E. Boice of Petroleum Administration for Defense. Speaking before a transportation conference of American Petroleum Institute, Boice said PAD already had approved projects which would involve laying 10,000 miles of pipe line this year—6500 miles of crude lines and 3500 miles of petroleum product lines. Scarcity of line pipe will be chief obstacle.

NO RELIEF FOR THE TIGHT CALIFORNIA oil supply situation can be expected this year although PAD has authorized construction of a large diameter pipe line from West Texas producing fields to the West Coast. Work on the line is unlikely to get underway for several months.

MORE THAN HALF OF THE WORLD'S OIL OUTPUT currently would be coming from outside the United States if Iran was producing 700,000 barrels daily as it was a year ago, before its fields were shut down. Currently, production of the U. S. is only about 600,000 barrels per day greater than remainder of the world. Consequently, crude production from outside U. S. soon can be expected to exceed that of U. S. Five years ago U. S. was producing nearly two-thirds of the world's oil.

IF SYNTHETIC PETROLEUM PLANTS ARE TO BE PROFITABLE more than 55 percent of their revenue would have to come from the production of chemicals. This is based on the use of coal according to a survey made by Ebasco Services, Inc., and therefore independent of either government or petroleum industry studies.

NEW TECHNIQUES in geophysical work promise to avoid injury to marine life in offshore prospecting. Employing a slow-burning powder that repeated experiments have shown to be quite harmless to marine life, a geophysical company is conducting a new type seismographic survey of the areas off the shores of California between Santa Barbara and Point Conception. Being carried out for three major companies, the work is a large-scale operation, requiring use of six vessels and about 30 men. One ship is equipped with a jetting spoon for embedding the charge in the ocean floor when recordings are being made in shallow waters. An extensive radio intercommunications system is employed. Self-orienting seismometers (earth movement detectors) are being used for the first time on the Pacific Coast.



There's more than acid to acidizing

Dowell Addition Agents

HELP SOLVE WELL PROBLEMS

Successful acidizing treatments demand more than just acid. Any well may present problems that call for special chemicals to be added to the acid. These *addition agents* can make the difference in the well's production.

Twenty years ago, Dowell pioneered acidizing by adding an "inhibitor" to hydrochloric acid. Since then Dowell has developed many other chemical addition agents for use in well treating. Dowell acidizing service has proved itself in every major oilfield. When you want the best in acidizing, call Dowell. Successful experience, the right materials and trained engineers are a combination that means results!

There's a Right Dowell Acid for Your Well

TO REMOVE MUD—Ask for *Dowell Mud Acid* . . . contains chemicals to make the acid capable of dissolving the clays found in producing formation and the clays commonly used in drilling muds.

TO SPEED REACTION RATE—Ask for *Dowell XX Acid* . . . contains intensifier to increase reaction rate on dolomitic formations and provides better solvent action on other formations.

TO REDUCE SILICATE SWELLING—Ask for *Dowell XM Acid* . . . contains chemicals to speed well clean-up. It reduces swelling of silicates found in clay minerals, a problem often encountered in acidizing treatments.

TO PREVENT EMULSIONS—Ask for *Dowell XW Acid* . . . contains an agent to help prevent the formation of emulsions and to aid in breaking emulsions which have already been formed.

TO INCREASE PENETRATING ABILITY—Ask for *Dowell XF Acid* . . . contains surface tension reducing agents to increase penetrating ability of the acid. Aids return of spent acid and permits treatment of relatively fine pores.

TO REMOVE "GYP"—Ask for *Dowell XG Acid* . . . contains a foaming agent to use in removal of "gyp" from tubing or face of pay zones.

DOWELL SERVICE

Acidizing • Jel-X • Electric Pilot • Perfo-Jet • Plastic • Paraffin Solvents
Chemical Cleaning for Heat Exchange Equipment • Jelflake • Bulk Inhibited Acid

DOWELL INCORPORATED • TULSA 1, OKLAHOMA
A Subsidiary of The Dow Chemical Company

"First in Oilfield Acidizing . . . Since 1932"

Look to **DOWELL**

FOR OIL INDUSTRY CHEMICAL SERVICE

Editor's Page

Congress Fails

OIL MAY BE THE NEXT industry seized by President Truman. With the petroleum labor dispute a complicated mess that involves the banding together of 22 separate unions for higher wages and other benefits, it is extremely difficult to see how the Wage Stabilization Board can handle the controversy successfully. It was under similar conditions that the President seized the properties of the steel companies.

Although President Truman at various times has requested emergency powers which would give him authority to seize properties, Congress has specifically withheld such powers. In the face of such Congressional action, the President has assumed his right of seizure. Despite enactment by Congress of the Taft-Hartley Act, the President also has assumed unconditionally that he individually has the authority to regulate both wages and profits.

Such action on the part of the President of the United States should be an occasion for great alarm to nonconservatives as well as to conservatives. The issue of confiscation goes far beyond the steel industry, actually affecting all property owners. Never before in the history of this nation has the principle of private property been so seriously threatened. The very foundations of the free enterprise system may be cracked by the President's establishing a principle of property seizure and procurement of wage increases for the purpose of paying off political debts.

• • •

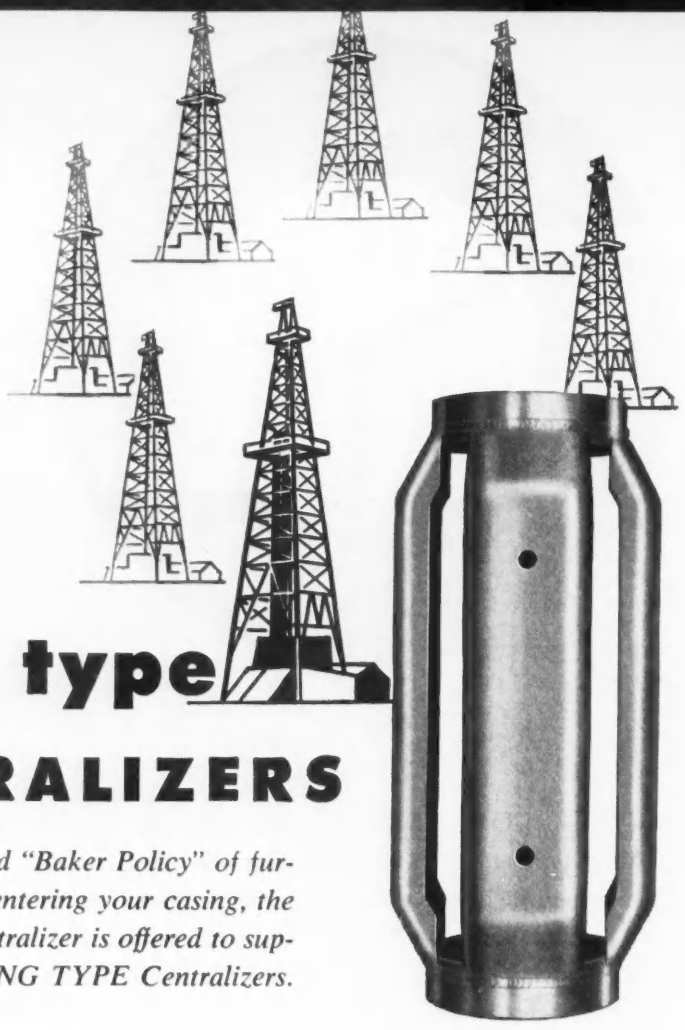
EVEN MORE DISHEARTENING and alarming, however, is the failure of Congress to do more than think about an investigation of the steel seizure. While the growing weakness of Congress has been demonstrated by the course of events in recent years, it was never more clearly accentuated than by developments in the steel dispute. Congress withheld granting such power, yet allows it by failing to act. Congressional reelections and current presidential preference voting in many states clearly indicate the dislike of the people for the policies of Truman and his administration, yet Congress passively allows a continuation of tactics which would have resulted in impeachment proceedings in the immediate past.

Consequently, much of the blame for what is happening in this country rests on Congress, where laws are supposed to be safeguarded as well as written. Congress has plenty of authority, but lacks the fortitude to exercise its rightful powers.

Congress' acquiescence can lead to the end of democracy in this country. Instead of complacently sitting by, Congress should at once assert its Constitutional authority and responsibilities, thereby serving notice that while dictatorial usurpation may be allowed in Russia it is not to be tolerated in the United States.

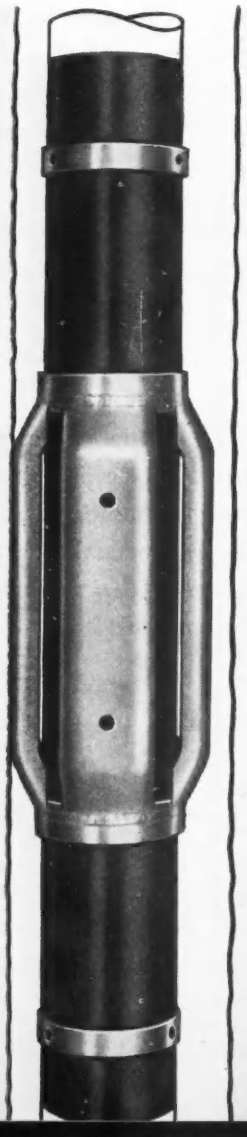
Warren L. Baker

sooner or later you will want



BAKER rigid type CASING CENTRALIZERS

In line with the long established "Baker Policy" of furnishing the most efficient means of centering your casing, the new Baker RIGID TYPE Casing Centralizer is offered to supplement the outstanding Baker SPRING TYPE Centralizers.



Baker
RIGID TYPE
Casing Centralizer,
Product 9131

CHOOSE THE "TYPE" YOU NEED

If your formations have a tendency to slough off, form cavities, or to wash out, you should continue to use Baker SPRING TYPE Casing Centralizers. The flexibility of the springs permits them to expand and compensate for these variations in hole size and still provide *maximum* centering force.

However, in harder formations, the Baker RIGID TYPE Casing Centralizer (Product No. 9131) is the one to use.

EASY TO INSTALL—POSITIVE CENTERING

The Baker RIGID TYPE Casing Centralizer normally is merely slipped over the casing and allowed to travel freely between collars. If exact spacing is desired, the Stop Collars are spot welded to the casing to prevent *vertical* movement of the centralizer, but to permit *free rotation* of casing while the *centralizer remains stationary*.

Baker RIGID TYPE Casing Centralizers are available to run on casing from 5½" to 9⅝" O.D., to center casing in well bores with minimum gauge from 7⅜" to 12¼". The inflexible "pads" ensure *positive clearance* between the casing and the wall of the open hole when casing is being cemented in harder formations.

FOR RIGID TYPE CASING CENTRALIZERS

BAKER OIL TOOLS, INC.

HOUSTON • LOS ANGELES • NEW YORK

The Changing Panorama

Ups and Downs Of Tax Problem

THE U. S. LIQUOR industry has the painful distinction of teaching the government tax-grabbers that you can't drink milk if you eat the cow.

The government's snatch from the January, 1952, sale of liquor was 52.3 percent less than for January, 1951, despite the fact that the federal excise tax is now higher. In January, 1951, the government's take was $211,528,000. In November, the tax was raised from $9 per gallon to $10.50. So what happened? The tipplers refused to tipple and the government's grab for January, 1952, was only $100,780,000. (Other explanations include cellar-stocking on eve of the tax increase and widespread turning to bootleggers for cheaper, tax-evading spirits.)

Here is a hangover that could easily spread to teetotalers—including the oil industry. Let the state and federal governments plaster a few more taxes on gasoline, and there won't be any need for those signs on the highways reading: "If you drink don't drive; if you drive, don't drink."

Nobody will be able to afford both liquids at the same time.

A Message for 1952

MY CREED

I DO NOT choose to be a common man. It is my right to be uncommon—if I can. I seek opportunity—not security. I do not wish to be a kept citizen, humbled and dulled by having the state look after me. I want to take the calculated risk; to dream and to build, to fail and to succeed. I refuse to barter incentive for a dole. I prefer the challenges of life to the guaranteed existence; the thrill of fulfillment to the stale calm of utopia. *I will not trade freedom for beneficence nor my dignity for a handout.* I will never cower before any master nor bend to any threat. It is my heritage to stand erect, proud and unafraid; to think and act for myself, enjoy the benefit of my creations and to face the world boldly and say, this I have done. All this is what it means to be an American.

by Dean Alfange

Copyright, 1951, United Newspapers Magazine Corporation. Permission granted for reprint by author and United Newspaper Magazine Corporation.

Oil Operations Face Critical Year

THIS YEAR could be more critical for international oil operations than 1951. Despite Iranian Premier Mossadegh's admission that he guessed wrong in assuming Iran could operate the nationalized oil properties of Anglo-Iranian Oil Company, repudiation of contracts of foreign oil concessionaires is a real threat in several areas.

Statements and actions by Administration officials in Washington add fuel to the embers. Supreme Court Justice William O. Douglas publicly states the U. S. should "sponsor revolutions" in backward lands. Such views come at a time when continued petroleum operations in Indonesia and Egypt, particularly, are uncertain.

A new retrenchment of operations has started in Peronist Argentina. Potential troubles brew elsewhere in South America. The relative calm in the Middle East outside of Iran is built on shaky foundations. Less important to oil operations, revolutions in North Africa gain momentum.

Near-Capacity Levels Forecast by PAD

THE WORLD-WIDE petroleum industry will be called upon to operate at near capacity levels during the remainder of 1952 and through next winter, according to forecast of Petroleum Administration for Defense, submitted to the National Petroleum Council.

As applicable to domestic operations, the PAD forecast indicates total demand for crude oil and products of the U. S. industry (domestic plus exports) for all of 1952 will average 7,821,000 barrels daily and will be increased to 8,702,000 barrels per day during the first quarter of 1953. Domestic crude oil production was estimated at 6,345,000 barrels daily for all of 1952 and at 6,501,000 barrels a day in the first three months of next year. Total imports (crude plus products) are expected to average 893,000 barrels daily in 1952 and rise to 985,000 barrels a day in the first quarter of 1953. Required crude oil runs to domestic refineries were placed at an average of 6,714,000 barrels daily for this year and 6,906,000 barrels per day for the first three months of next year.

The 6,906,000 barrels daily of refinery runs for the first part of next year were also predicted as a requirement during the last quarter of 1952, PAD stated, which would represent operations at 91 percent of capacity. Such requirements of U. S. refineries and equally high rate of operations of European refineries through next winter will be needed, PAD predicted, to meet domestic demand and to continue to cover the loss of Iran's Abadan refinery output. PAD said that in view of the continued high levels of demand, it will be 1954 before much reserve refining capacity will be re-established.

U. S. crude oil producibility overall will be adequate through next winter, particularly following completion later this year of several major crude oil pipe line outlets; but California will face a shortage of crude, and it will be necessary to continue diverting military liftings to other areas, according to PAD's forecast.

The agency estimated distillate fuel oil demands next winter 10.5 percent, or 180,000 barrels daily, above last winter.

Motor fuel demand in 1952 was estimated at an average of 4.9 percent over last year, while residual fuel oil demand for 1952 was placed at 1,634,000 barrels daily, up less than 1 percent over 1951.

PAD predicted that no world-wide relief from the tanker shortage will be realized next winter and that it may continue through 1953. Mutual Security Agency officials estimated that American oil companies will be required to supply Europe with 617,000 barrels daily of total petroleum in the period from July 1, 1952 to June 30, 1953.

Report from the Observatory

Growth in Stocks Hurts Outlook

By RAY L. DUDLEY, Publisher, and WARREN L. BAKER, Editor

SHARPLY RISING CRUDE STOCKS greatly damaged the petroleum industry's economic position during the past month. Growth of crude inventories and boosting of gasoline stocks to an all-time peak of 8 million barrels above year-ago levels confronts the industry with the necessity of closely tailoring its producing and refining volumes to demand requirements during the remainder of the year.

Having entered the gasoline consuming season with adequate motor fuel supplies, the industry should now begin to program its operations in anticipation of prospective demand next winter. This problem is made more difficult to accomplish successfully because of the need for a high rate of refining in order to produce large quantities of fuel oil in preparation for next winter, which necessarily will result in making big amounts of gasoline.

Further intensifying the over-all problem is the continued tight supply in California, where stocks of crude and all products are beneath year-ago volumes. All the gain in crude and gasoline inventories has been concentrated outside of California.

• • •

CRUDE STOCKS INCREASED 7½ million barrels or 271,000 barrels per day during the past month in reaching 260⅔ million barrels on April 12. At this level they were 23½ million barrels greater than a year ago. This represented a reversal of the downward trend which existed the past few months.

As compared with volumes in storage a year ago most of the increase in crude inventories has occurred in Texas. Although 3¼ million fewer barrels were in East Texas tanks, Texas as a whole had enlarged its inventories by 14 million barrels. Most of the gain was in West Texas, where stocks were 9⅔ million barrels above the corresponding period of 1951.

Largest addition to storage the past month also was in Texas, where crude stocks jumped 2¾ million barrels. However, the gain was fairly evenly distributed among the state's various districts. Stocks of foreign crude also contributed heavily to the past month's increase, rising 1½ million barrels during the period. These two crudes accounted for well over half of the nation-wide gain.

Growth in crude stocks caused strong sentiment among purchasing companies for a reduction in Texas crude production allowable. Consequently, Texas' permissible output for May was curtailed by 168,892 barrels daily. This was the second consecutive cut in allowable, reducing the state's output by nearly 300,000 barrels from its March peak. This action should greatly enhance trends during the coming month, and normal gains in consuming rates during subsequent months can further improve the industry's position.

• • •

A HEATING OIL SHORTAGE may confront the industry next winter, although the current situation tends toward excessive supply in crude and gasoline. If increased requirements of next winter are to be met, refiners must manufacture substantially larger quantities than ever before during the next six months.

Mid-April distillate fuel inventories in the U. S. totaled 48½ million, only 1¾ million barrels greater than a year ago. In view of higher demand and no assurance that next winter will not be colder than the comparatively mild past winter, these stocks should be increased by a minimum of 65 million barrels by next November so that inventories will total betwen 110 and 115 million barrels at the start of the heavy consuming season.

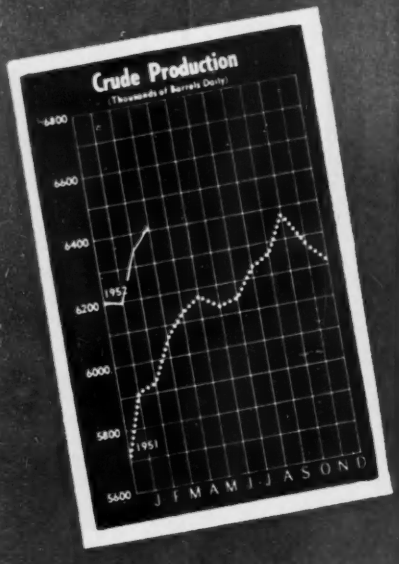
With plants generally equipped to produce a maximum quantity of gasoline, U. S. refiners must combat several troublesome factors in adjusting product yields so more fuel oil will be manufactured. Adjustments are limited by the need for producing gasoline. With fuel oil selling for roughly one-half the price of gasoline, and frozen at this level by government controls, refiners are discouraged from reducing gasoline output in order to make more fuel oil. On the other hand, if refiners depend on high refinery runs to produce enough heating oil, they will make too much gasoline.

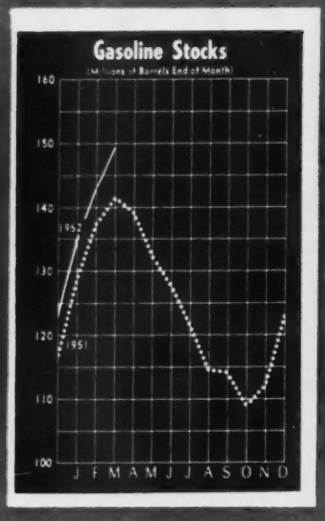
The problem is intensified by the continued shutdown of the big Iranian refinery at Abadan, normally a heavy producer of heating oils. With western Europe stocks barely sufficient to provide minimum working inventories and refineries running at capacity, an acute European shortage may occur next winter. U. S. refineries may be called upon to furnish larger than normal quantities for western Europe, which could reduce the distillate fuel supply available next winter in the U. S. Europe's declining coal production adds to the prospects of large fuel oil requirements in this area next winter.

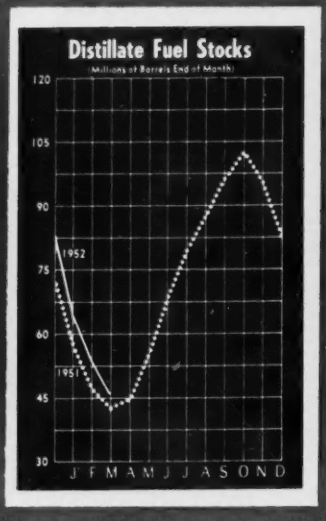
SPECIFY
NORRIS QUALITY
4 8-V-THD STD. SEAMLESS
NORRIS QUALITY
4 8-V x 2 STD. SEAMLESS
W.C. NORRIS MFG.
70 YEARS
NORRIS QUALITY
6" x 4" SWG
W.C. NORRIS, MANUFACTURER, INC.
TULSA, OKLAHOMA
WEST COAST DISTRIBUTORS:
REPUBLIC SUPPLY COMPANY OF CALIFORNIA
Los Angeles
Since 1882
BRANCHES:
HOUSTON, KILGORE, ODESSA, TEXAS
SALEM, HAMMOND, CASPER, WYOMING
EXPORT: 30 ROCKEFELLER PLAZA, NEW YORK CITY
REGISTER and VOTE—it's YOUR country

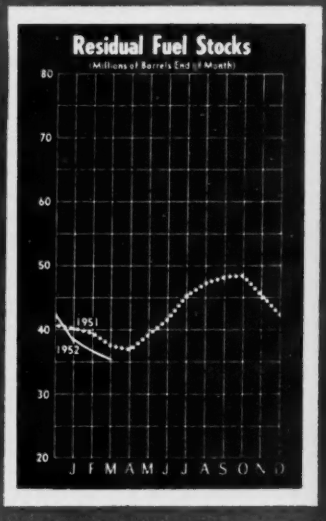
Petroleum

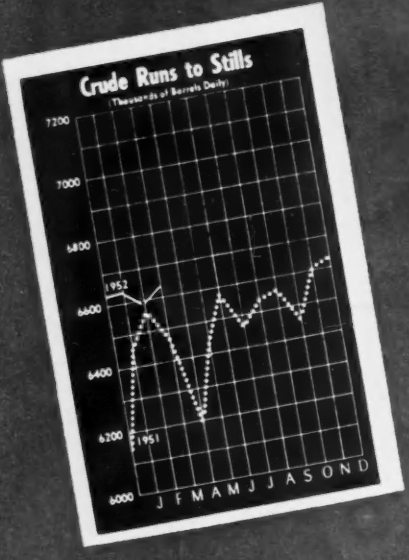
By CECIL W. SMITH, VO

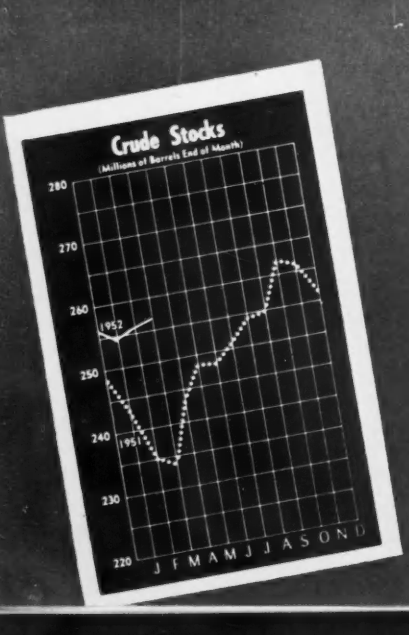












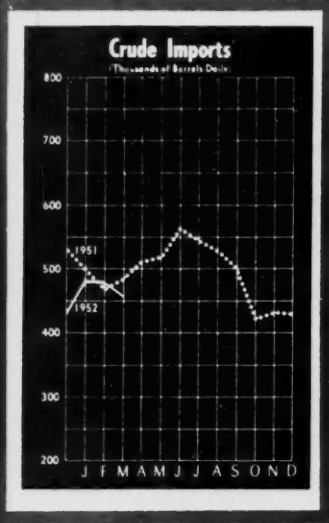
U. S. Crude Production by States

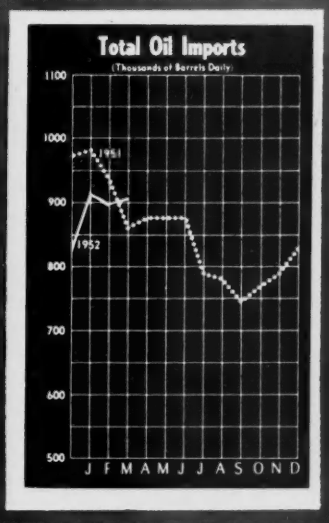
(THOUSANDS OF BARRELS)

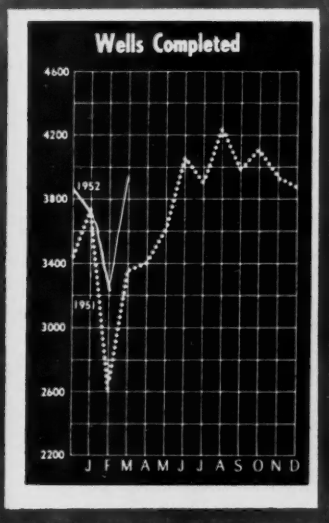
STATE or DISTRICT	DAILY AVERAGE PRODUCTION				TOTAL PRODUCTION First Three Months		
	March, 1952	February, 1952	March, 1951	% Diff. March, '51-'52	1952	1951	% Diff. '51-'52
Alabama	2.6	2.7	2.6	.....	248	235	+ 5.5
Arkansas	81.0	80.8	82.5	— 1.8	7,353	7,395	— 0.6
California	975.3	977.2	961.7	+ 1.4	88,704	86,474	+ 2.6
Colorado	83.4	80.2	76.2	+ 9.4	7,348	6,776	+ 8.4
Florida	1.6	1.7	1.6	.....	152	140	+ 8.6
Illinois	167.8	163.5	160.5	+ 4.5	14,863	14,452	+ 2.8
Indiana	30.6	29.6	26.7	+ 14.6	2,759	2,263	+ 21.9
Kansas	315.7	320.8	315.6	+ 0.1	29,130	27,784	+ 4.8
Kentucky	35.4	34.9	28.2	+ 25.5	3,205	2,525	+ 26.9
Louisiana	669.2	659.1	632.8	+ 5.8	59,854	56,527	+ 5.9
North Louisiana	127.7	127.9	120.0	+ 6.4	11,378	10,765	+ 5.7
South Louisiana	541.5	531.2	512.8	+ 5.6	48,476	45,762	+ 5.9
Michigan	37.7	37.5	39.2	— 3.8	3,417	3,557	— 3.9
Mississippi	102.6	102.7	101.5	+ 1.2	9,277	9,288	— 0.1
Missouri	0.1	0.1	0.1	.....	9	7	+ 28.6
Montana	23.4	24.8	23.1	+ 1.3	2,174	2,151	+ 1.1
Nebraska	6.2	6.0	8.1	— 23.5	538	768	— 30.0
New Mexico	160.1	156.2	142.0	+ 12.7	14,329	12,483	+ 14.8
New York	13.1	13.3	11.5	+ 13.9	1,151	1,035	+ 11.2
North Dakota	0.6	0.4	.....	.....	33	.....	.....
Ohio	8.6	8.6	8.9	— 3.4	778	762	+ 2.1
Oklahoma	522.9	518.9	509.0	+ 2.7	47,641	45,112	+ 5.6
Pennsylvania	28.5	28.7	31.5	— 9.5	2,650	2,879	— 8.0
Tennessee	0.1	.....	0.1	.....	3	4	— 25.0
Texas	2,951.5	2,910.6	2,686.6	+ 9.9	262,308	236,001	+ 11.1
Dist. 1—South Central	33.7	33.1	33.0	+ 2.1	3,008	2,925	+ 2.8
Dist. 2—Middle Gulf	170.1	169.8	160.1	+ 6.2	15,150	14,116	+ 7.3
Dist. 3—Upper Gulf	499.3	498.6	484.9	+ 3.0	44,683	43,003	+ 3.9
Dist. 4—Lower Gulf-S.W.	272.5	266.3	247.3	+ 10.2	23,955	21,905	+ 9.4
Dist. 5—East Central	62.7	62.5	48.8	+ 28.5	5,377	4,260	+ 26.2
Dist. 6—Northeast	396.5	399.2	381.0	+ 4.1	36,040	34,148	+ 5.5
Dist. 7-B—N. Central	88.6	88.4	79.2	+ 11.9	7,918	7,034	+ 12.6
Dist. 7-C—W. Central	145.8	141.9	91.9	+ 58.7	12,664	7,926	+ 59.8
Dist. 8—West	1,038.5	1,005.3	891.6	+ 16.5	90,461	78,113	+ 15.8
Dist. 9—North	161.6	162.3	147.5	+ 9.6	14,604	13,572	+ 7.6
Dist. 10—Panhandle	82.2	83.2	89.1	— 7.8	7,550	8,069	— 6.4
Utah	3.9	4.0	3.5	+ 11.4	356	311	+ 14.5
Virginia	0.1	0.1	.....	.....	7	3	+133.3
West Virginia	7.3	7.4	7.4	— 1.4	671	671	.....
Wyoming	179.4	183.4	191.6	— 6.4	16,676	17,182	— 3.0
Total United States	6,408.7	6,353.4	6,052.5	+ 5.9	575,632	536,775	+ 7.2

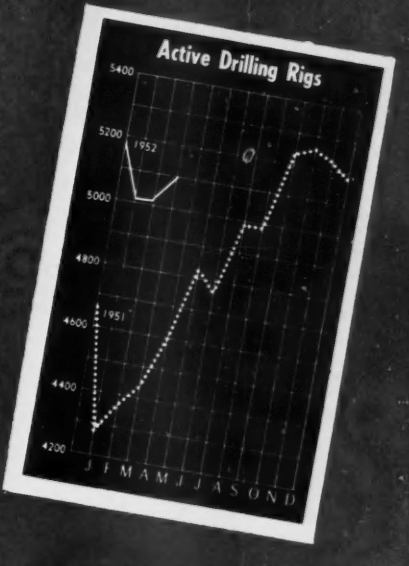
n Trends in U. S.

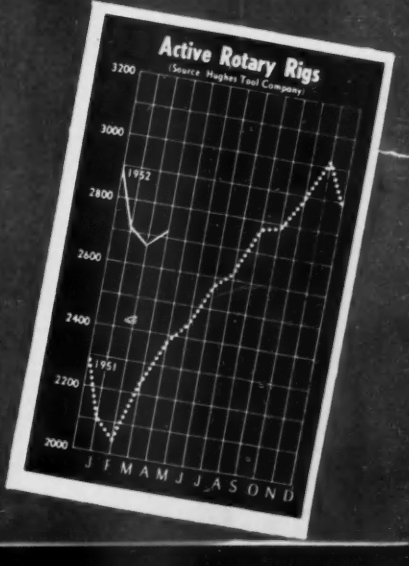
ITH, WORLD OIL Staff









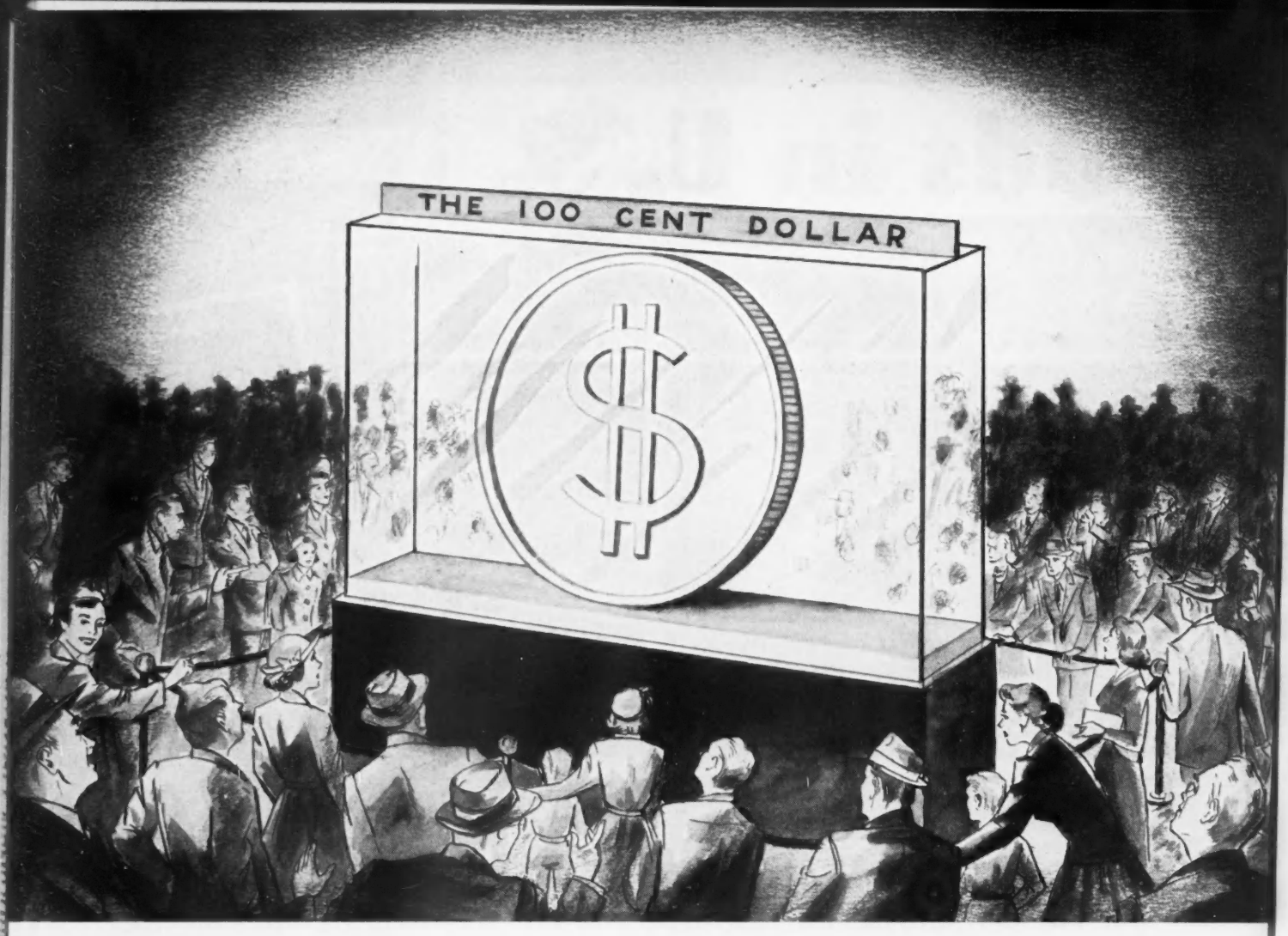


Crude Oil and Refined Products Trends

(THOUSANDS OF BARRELS)

MONTH	CRUDE OIL			GASOLINE		DISTILLATE FUEL		RESIDUAL FUEL		DAILY IMPORTS	
	Production Daily	Runs to Stills Daily	Stocks End of Month	Production Daily	Stocks End of Month	Production Daily	Stocks End of Month	Production Daily	Stocks End of Month	Crude Oil	Total Oils
1950:											
March	4,878	5,336	241,098	2,539	133,766	938	37,777	1,154	41,860	471	869
April	4,968	5,193	244,605	2,508	128,057	977	37,530	1,048	39,979	511	888
May	5,143	5,535	239,877	2,647	121,035	997	42,739	1,063	39,482	439	766
June	5,378	5,655	242,287	2,748	114,074	1,037	53,679	1,069	40,124	498	838
July	5,484	5,882	240,270	2,835	111,055	1,040	62,555	1,140	42,165	486	806
August	5,665	6,067	237,393	2,932	107,067	1,089	68,426	1,148	40,979	501	839
September	5,888	6,059	242,311	2,849	105,748	1,180	78,270	1,178	41,966	525	859
October	5,900	6,077	246,424	2,875	105,764	1,217	85,643	1,250	45,004	510	896
November	5,891	6,085	250,016	2,859	109,005	1,218	86,113	1,240	45,048	466	891
December	5,719	6,143	248,463	2,879	116,769	1,343	71,948	1,306	40,750	530	974
1951:											
January	5,907	6,450	243,107	2,962	128,479	1,427	58,424	1,368	40,317	499	977
February	5,930	6,562	235,247	2,906	137,243	1,419	47,587	1,382	39,409	468	937
March	6,052	6,469	233,824	2,908	141,456	1,327	42,978	1,348	37,516	483	861
April	6,127	6,183	243,180	2,821	139,188	1,171	44,736	1,230	36,910	511	871
May	6,170	6,436	248,418	3,031	132,261	1,210	55,273	1,265	39,317	518	876
June	6,130	6,575	248,170	3,100	127,595	1,254	67,839	1,277	41,566	563	876
July	6,141	6,462	250,847	3,091	121,482	1,228	79,437	1,275	45,163	546	788
August	6,232	6,539	254,276	3,114	114,446	1,237	87,432	1,226	47,243	529	780
September	6,261	6,558	254,900	3,127	114,147	1,282	96,241	1,228	48,212	500	744
October	6,375	6,446	262,266	3,105	108,800	1,295	102,561	1,224	48,415	421	769
November	6,272	6,609	261,100	3,130	112,028	1,358	94,917	1,304	45,378	425	802
December	6,182	6,646	255,783	3,150	124,982	1,442	80,785	1,313	42,063	423	834
1952:											
January	6,217	6,640	254,007	3,094	144,339	1,456	66,969	1,338	39,523	488	951
February	6,353	6,595	256,271	3,102	142,641	1,514	52,856	1,309	36,537	476	891
March	6,409	6,640	257,172	3,108	149,631	1,421	45,109	1,284	35,593	461	900
March, 1952: Change											
In Month	+56	+45	+901	+6	+6,990	—93	—7,747	—25	—944	—15	+9
In Year	+357	+171	+23,348	+200	+8,175	+94	+2,131	—64	—1,923	—22	+39
Week Ended:											
4-12-52	6,366	6,315	260,698	3,077	*157,781	1,345	*48,494	1,249	*35,880	503	791
4-14-51	6,120	6,127	237,106	2,767	*147,734	1,213	*47,048	1,262	*37,691	435	948

*Stocks on new basis, and not comparable with above totals.



Who Says the 100 Cent Dolla Is a Museum Piece?

. . . Actually, the American Dollar buys *more* in Halliburton cementing service today than it did in 1924!

Erle P. Halliburton

Chairman of the Company

HALLIBURTON OIL WELL CEMENTING CO.

Duncan, Oklahoma

Monthly News Analysis

Continued Labor Unrest Still Stalks Oil Industry

Continuing to divide oil companies and oil workers unions as they faced the prospect of a nation-wide strike on April 30 were basic considerations of far greater importance than the exact level for wage rates. These questions included especially the principle of nation-wide bargaining, sought by unions and opposed by the companies, and the question of whether the oil industry might be taken over by the federal government to prevent strikes, as was the steel industry—an action striking at the heart of constitutional government and the free enterprise system and threatening to give the government dictatorial powers over both companies and workers.

The unions had served notice that unless questions involved could be settled previously, they would go on strike April 30. This decision was made after the Wage Stabilization Board withdrew from the negotiations and gave up on trying to bring about a settlement, putting the matter back entirely into the hands of the companies and the unions.

As the April 30 deadline approached, the outlook for settlement was dim. Company officials reasserted that problems involved were local questions, peculiar to companies and plants concerned, and showed no disposition to participate in any negotiations on a national or general basis. Unions insisted that only a general wage raise of 25 cents an hour was acceptable, and some smaller refiners asserted they could not meet such an increase except at greater sacrifice than major companies. Various companies claimed that there were special problems with respect to their particular operations. The negotiations appeared to be getting nowhere.

A week before the new strike deadline, it was reported that negotiations had broken down between one large refiner, Sinclair Refining Company, and the Oil Workers International Union (C.I.O.), making a strike of the nation's oil refining industry a grave threat. At that time union employes at Sinclair's refinery in Houston were warned to be ready to strike at 12:01 a.m. Wednesday, April 30, it was reported.

At Salt Lake City, the Oil Workers International Union Local 286 on April 22 called a strike effective at noon Thursday, April 24, at the refinery of Utah Oil Refining Company, subsidiary of Standard Oil Company (Indiana). The action was taken by the local independently of the national organization of OWIU, in violation of a requirement that such action be approved by the national unit. The union at the Utah plant consists of 475 employes.

As the April 30 deadline drew near, there was some speculation that the wage dispute might be referred again to the Wage Stabilization Board. It was further predicted that President Truman possibly might invoke the provisions of the Taft-Hartley Act, which prescribes an 80-day "cooling off" period and further negotiating.

Previously, there had been two other strike deadlines, and in each case work stoppage was delayed by request of the Wage Stabilization Board.

PAD Approval is Granted Common Carrier Pipe Line

Petroleum Administration for Defense approval for construction of the first common carrier refined products pipe line has been given to United States Pipe Line Company for a proposed Texas Gulf Coast-to-Newark, N. J. carrier.

In its approval, which carried a recommendation for rapid tax amortization of 25 percent of construction cost, PAD gave the company until June 15 to submit additional information on engineering and financing arrangements as a basis for construction materials allotments.

United States Pipe Line, formed in September, 1950, for the purpose of building a common carrier products line, has proposed the line as a 16-inch connection between Beaumont, Texas, and Cincinnati and a 14-inch link eastward to Newark. Initial capacity would be for 125,000 barrels daily. Originally the company had proposed construction of a common carrier products line from the Houston-Beaumont area to Cincinnati and then to Paducah, Ky., with extensions to Ohio and Indiana industrial areas. At that time estimates were that the project would require approximately 110,000 tons of steel and would cost upwards of $50 million.

Shortages in Equipment Remain, Survey Shows

The substantial boost in oil country tubular goods, line pipe and other essential steel items for the expanded industry operations scheduled to start with the third quarter may find the production branch of the industry handicapped by continued shortages of necessary oil field equipment supplies. A survey of such supplies was conducted by Petroleum Administration for Defense in conference with equipment representatives, supply store distributors and government officials.

Findings of the survey now being studied by PAD reveals some scattered improvements in inventories, but for the most part shortages ranging to acute situations were the rule. The situation for various types of oil field equipment:

Valves and Fittings: Over-all no problems at present. Inventories of steel-welded fittings are somewhat low and steel valves in larger sizes for high-pressure use are in short supply.

Anti-Friction Bearings: Inventories are lower than normal, but cause no pressing problem. Production of bearings will have to be increased, however, if the industry is to realize projected expansion program.

Roller Chain for Drilling Rigs: Inventories are very low, and in some cases exhausted. National Production Authority has increased steel allotments for this type chain and anticipates early improvement.

Drilling Rigs: Small rigs are practically unavailable. Supply stores now are placing orders nine months in advance. Shortage of portable masts and derricks listed as chief bottleneck to drilling rig availability.

Drill Pipe: This continues to be in extremely acute supply. Supply store men report contractors are using pipe worn beyond the safety point. NPA estimates at present rates of production, total 1952 output of drill pipe will be 104,000 tons, or double the 1950 production. Supply store men recommended that instead of restricting M-6A set-aside field stocks of drill pipe, tubing and casing to purchases by operators who normally drill eight or fewer wells in a year, PAD should open these stocks to all operators who normally drill 20 or fewer wells annually. Small operators, supply men reported, do not buy any

great amount of large-diameter pipe, which results in accumulation of large-diameter pipe in inventory and restricts supply stores in placing maximum new mill orders.

Unit Pumpers: Larger sizes are in particular short supply, with inventories of small pumpers about normal.

Sucker Rods: Carbon-steel sucker rods reported in adequate supply, but supply of nickel-bearing rods continues very tight. High defense needs indicate nickel supply situation will become worse before improvement is noted.

Rock Bits and Tool Joints: Reported in adequate supply.

Wire Rope: Sizes used by petroleum industry reported to be plentiful. Recommendation was made to remove distribution from government controls.

Non-Captive Engines (those not component parts of rigs, pumpers): Acute shortage exists for engines of 100-300 horsepower. Smaller engines in adequate supply.

West Texas-California Crude Oil Pipe Line OK'd

Initial approval has been given by Petroleum Administration for Defense for construction of a West Texas-California crude oil pipe line. This came in a letter from Petroleum Administrator Bruce K. Brown to West Coast Pipe Line Company of Dallas, and advised the company to file financial and engineering data by June 15.

West Coast Pipe Line proposes to construct a 1100-mile 20- and 22-inch line from Wink, Texas, to the Los Angeles area and to erect a refinery near Phoenix, Ariz. Initial capacity would be scheduled at 50,000 barrels daily, 15,000 barrels of which would be for the proposed Phoenix refinery and the balance to independent refineries on the West Coast. Ultimate proposed capacity is 180,000 barrels daily.

Construction of a West Coast outlet for West Texas-New Mexico crude has been under study for some time. In its initial approval, which includes a recommendation for rapid tax amortization of 25 percent of building costs, PAD acted contrary to the recommendations contained in the comprehensive study, "Transportation of Oil," made for the agency by a group of eight industry experts headed by John W. Boatwright, general manager of the distribution economics department of Standard Oil Company (Indiana).

This study, which was completed in mid-1951 and made public by PAD early this year, stated that after completion of the several crude outlets from the Permian Basin to the Texas Gulf and East Texas (see WORLD OIL, April 1952, page 55) the West Texas-New Mexico area would still have surplus MER production of 124,000 barrels daily. Assuming MER production rates in other areas that now or in the near future require West Texas crude, and average refinery operating levels in those districts, the transportation committee estimated that approximately 400,000 barrels daily will be surplus production in West Texas.

However, the committee's recommendations concerning outlets for West Texas crude were:

- If additional crude oil is to be made available to the West Coast, a line from Canadian sources would appear to be more favored from a defense standpoint because of mounting surplus production in Western Canada, and a Western Canadian line to the U. S. West Coast could also serve to supply the U. S. and Canadian Pacific Northwest, reducing the latter area's dependence on water transportation from California for petroleum products.
- If the Western Hemisphere should find it necessary to assume increased responsibilities for petroleum supplies in Western Europe and Africa, maximum availability of crude oil to the Texas Gulf Coast and Atlantic seaboard would be highly desirable.

The committee also noted that the two proposed West Texas-West Coast crude oil lines then being considered by PAD would require an estimated 240,000 tons of steel each, while the two approved outlets from West Texas to East Texas and the Gulf Coast together require only 255,000 tons. PAD in giving the nod to West Coast pipe line said the proposed line would require 200,000 tons of steel.

Two Companies Halt Operations in Egypt

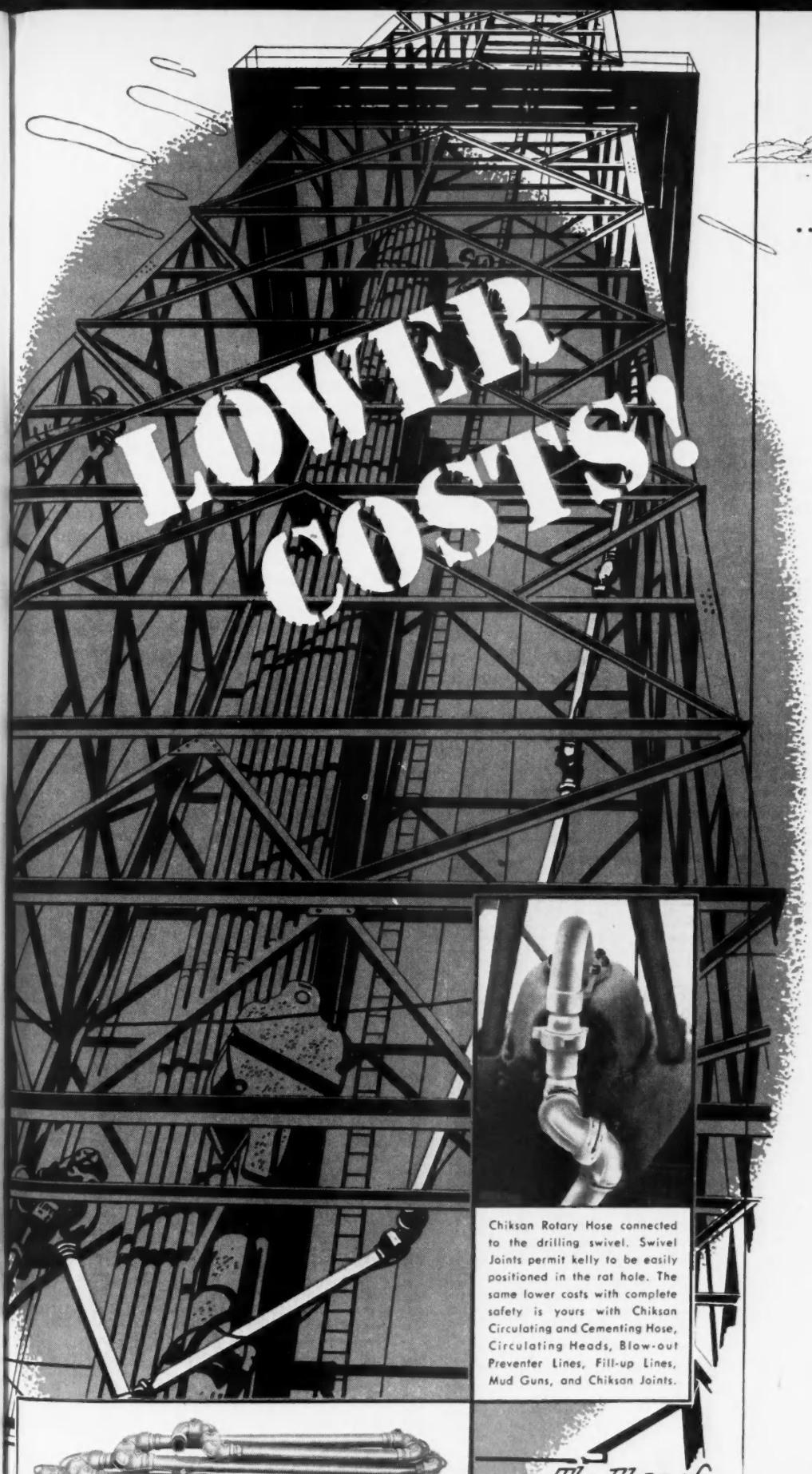
Failure of the Egyptian government to remove hardships placed on the two foreign petroleum companies operating there resulted last month in the announcement by both companies that they were halting all drilling operations in the country.

The companies — Anglo-Egyptian Oilfields, Ltd. (Royal Dutch-Shell) and Socony-Vacuum Oil Company— will continue producing their four fields, which have a total output of 46,000 barrels daily, but the limited exploratory drilling operations that have been conducted on the Sinai Peninsula will be halted.

This impasse was created by the passage of the 1948 Mines and Quarries Law, which contains many restrictions, the principal one being a requirement that production leases can only be held by Egyptian companies or those controlled through 51 percent ownership by Egyptian nationals. Proposed amendments to this law were drafted in 1950 and would have established minimum terms acceptable to the companies, but this was never brought to a vote before Parliament. (See WORLD OIL, January 1952.) The Egyptian government's continued refusal to revise its petroleum law is ironical in the sense that the nation's total production of crude oil falls short of domestic demand by approximately 4000 barrels daily.

Crude production now comes from the Ras Gharib and Hurghada fields (A.E.O.), on the western side of the Gulf of Suez, and from the Sudr and Asl fields (A.E.O.-Socony), on the Sinai Peninsula. An additional proved field, Ras Matarma on the peninsula with three shut-in wells, was discovered after the passage of the law requiring Egyptian companies to own producing leases, so it has not been produced. However, Ras Matarma production if added to the total, could make the nation above self sufficient on petroleum requirements. Though no wildcats were drilled in 1951, seven exploratory wells have been drilled at Nebwi, just south of Asl, and four others were drilled at Lagie, just south of Nebwi. These were classed as dry holes, but enough traces of oil were found to justify further drilling if favorable terms could be obtained. Prior to the drilling halt, two rigs were on development work in the Sudr and Asl fields.

Two promises have been made this year by Egyptian government officials to modify the Egyptian company requirement that would allow foreign companies to own 51 percent of Egyptian companies, though it would be stipulated that such companies must be legally domiciled in Egypt. Any possible solution to Egypt's petroleum development is clouded by the present differences between the Egyptian and British governments over the latter's continued occupancy of the Suez Canal area. The controversy stems from a strong nationalistic and anti-foreign sentiment of certain groups. The Egyptian Parliament has been in forced adjournment and whether workable amendments can be passed by the lawmakers when Parliament reconvenes is questionable.



...with complete safety from grass roots to deep stuff use CHIKSAN

BACK in 1859 when the Drake inched its way an ambitious 69½ feet into the earth, it was just an oversize digging job. But with drill and rotary hose biting deeper and deeper it's a project that calls for every ounce of brain, brawn and mechanical dexterity.

It takes tough-fibred material, snake-like flexibility, stout-hearted men—and Chiksan *All Steel* Rotary Hose to eat out the heart of old Mother Earth to depths from 69½ feet to as deep as 20,000 feet.

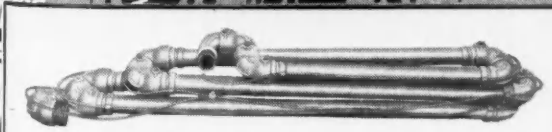
Chiksan *All Steel* Rotary Hose provides uniform strength and safety from slush pump to well bottom, demanded by higher pump pressures, greater depth, and unforeseen high pressures encountered in wildcat drilling. Lower costs result whether you figure costs per foot drilled—per pump hour or life of hose.

On the rig, in the field, in factory, at dockside—wherever liquid, gas and progress must flow, Chiksan is doing the job better, with fewer stoppages and replacements and more economy of both time and money.

●

From first bite of the drill to final flow from tank-truck to neighborhood gasoline pump, Chiksan Ball Bearing Swivel Joints are serving in close partnership with the oil men of the world. Whatever your installation or design problem—whether it's an old story to us or a new challenge to be met and won, Chiksan Project Engineers will help you find the answer—completely—fast.

Chiksan Rotary Hose connected to the drilling swivel. Swivel Joints permit kelly to be easily positioned in the rat hole. The same lower costs with complete safety is yours with Chiksan Circulating and Cementing Hose, Circulating Heads, Blow-out Preventer Lines, Fill-up Lines, Mud Guns, and Chiksan Joints.



Chiksan *All Steel* Rotary Hose will withstand constant flexing and bending on short radius—corrosion and abrasion from mud, oil, extreme climatic conditions—and the rugged torture of transportation.

The Flow of Enterprise Relies on

CHIKSAN

Ball-Bearing Swivel Joints

Sold by Leading Supply Stores Everywhere

Representatives in Principal Cities • Write for Catalog 51-D—Dept. 5-W0

CHIKSAN COMPANY • BREA, CALIFORNIA • Chicago 28, Illinois • Newark 2, New Jersey

Well Equipment Mfg. Corp. (Division), Houston 1, Texas • Chiksan Export Company (Subsidiary), Brea, California • Newark 2, N. J.

Completions Reach First-Quarter Peak

DRILLING activity increased during March, even over the stepped-up rates of the year's first two months, and as the initial quarter ended the industry had completed more wells than it had ever done in any comparable period. Wells finaled in March hit the 4000-mark, a level not reached in the peak drilling year of 1951 until June or two months later.

As the year's drilling program gathered momentum, records showed a total of 11,087 wells completed for a sizeable gain of 12.1 percent over the 9891 recorded in the first three months of last year. That comparison points out an even more remarkable industry record when it is remembered that last year was the peak drilling year of all time and its first quarter had been the most active of similar periods.

While wells were climbing by 12.1 percent, footage drilled in those wells was rising by an impressive 10,326,230 feet or 22.1 percent. Which indicated that each new well drilled during the first three months was 317 feet deeper on the average than its counterpart of last year. The average depth of this year's wells being 4193 feet, while a year before the average had been 3876 feet.

Texas, the leading drilling state, accounted for almost one-half of the U. S. drilling gain. So far this year, a total of 4753 wells have been completed in the state, and that amounted to a gain of 528 wells or 12.5 percent over last year's total for the first quarter. That increase in wells amounted to 44 percent of the nation's overall gain.

Oklahoma continued in its role as the nation's No. 2 drilling state by completing 1417 wells and they represented a hike of 5.1 percent over the 1348 credited to last year's comparable period. Number 3 spot in the national picture was held by Kansas with 976 tests, 10.9 percent more than it mustered a year before. Kansas had no trouble holding its position, because the next closest was California with 649 or 327 less.

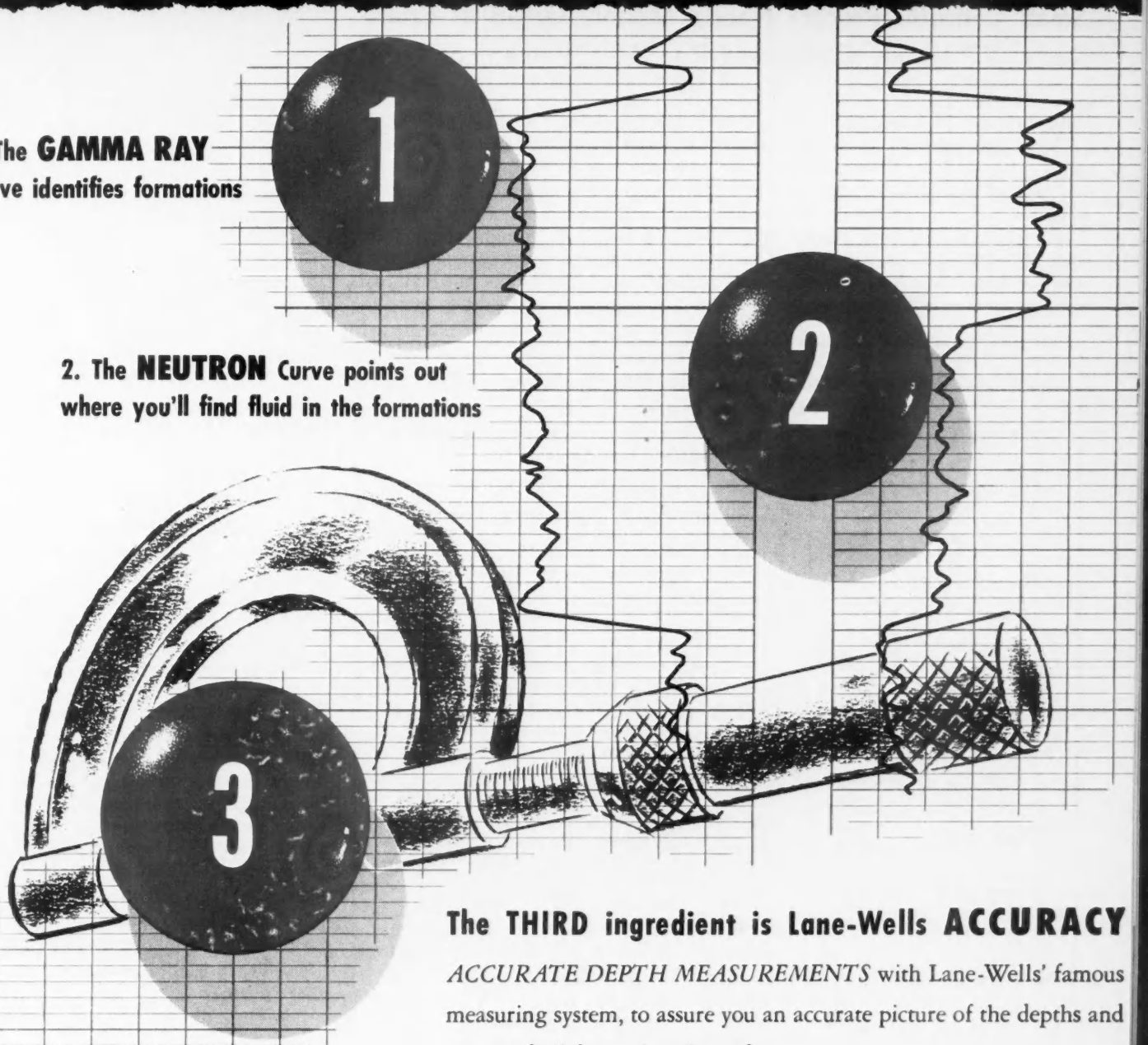
One hundred wells less than California's was recorded by Louisiana for a firm fourth position.

Well Completions in the United States During March, 1952, and First Three Months, 1952

(Figures compiled by WORLD OIL Staff from private reports and other sources as follows: Illinois from Illinois Geological Survey; Indiana from Indiana Division of Geology; Missouri from Missouri Geological Survey; Tennessee from Tennessee Division of Geology; Bradford, Kane-Clarendon and Allegany fields of Pennsylvania and New York from the "Producers Monthly.")

State or District	MONTHLY COMPLETIONS, MARCH, 1952									TOTAL COMPLETIONS				CUMULATIVE TOTALS January-March					Rigs in Operation (Drilling, Rigging-Up and Shut Down)		
	NEW WELLS																				
	Oil	Dist.	Gas	Dry	Water Input	Gas Input	Water Disposal	Total New	Total Drilled Deeper	Mar., 1952	Feb., 1952	Mar., 1951	Footage Mar., 1952	Wells 1952	Wells 1951	Percent Diff.	Footage 1952	Footage 1951	Mar. 31, 1952	Feb. 29, 1952	Mar. 31, 1951
Alabama				4				4		4	4	3	24,321	11	14	— 21.4	58,386	67,235	7	6	9
Arizona												1			2	—100.0		3,820	3	2	
Arkansas	18		4	9				31		31	26	31	103,830	87	83	+ 4.8	322,583	305,205	38	33	25
California	184	1	4	32			1	222	11	233	207	208	999,008	649	566	+ 14.7	2,608,939	2,129,472	253	255	220
Colorado	15	1	2	16				34		34	35	10	196,551	98	41	+139.0	552,433	195,558	39	33	26
Florida											1			1			11,794		1		
Idaho															1	—100.0		12,844	1	1	
Illinois	64		1	70				135		135	96	95	339,734	343	400	— 14.3	834,865	954,436	152	169	172
Indiana	19			46				65		65	74	92	115,977	258	234	+ 10.3	456,733	404,509	145	144	190
Kansas	168		14	133			4	319		319	307	294	1,116,851	976	880	+ 10.9	3,409,764	2,973,024	442	413	366
Kentucky	36		15	30				81		81	79	71	165,877	238	228	+ 4.4	484,843	458,015	91	88	84
Louisiana	111	6	13	60				190		190	145	180	1,410,451	548	493	+ 11.2	3,741,191	3,302,063	230	238	196
North Louisiana	54	3	8	24				89		89	74	105	347,474	292	241	+ 21.2	1,130,247	885,967	62	61	62
South Louisiana	57	3	5	36				101		101	71	75	1,062,977	256	252	+ 1.6	2,610,944	2,416,096	168	177	134
Maryland			1	1				2		2	4	3	7,122	10	6	+ 66.7	39,668	22,879	23	25	14
Michigan	28		2	31			1	62	1	63	47	65	160,366	146	151	— 3.3	387,517	384,302	101	115	95
Mississippi	6		2	25				33		33	34	27	222,101	104	65	+ 60.0	739,415	448,772	25	27	26
Missouri	2			1				3		3	2		3,984	6			8,523		6	6	5
Montana	10			3				13		13	13	6	34,086	38	33	+ 15.2	109,829	74,381	51	37	26
Nebraska	3			15				18		18	7	13	95,795	47	30	+ 56.7	239,612	133,491	12	14	13
Nevada															1	—100.0		10,314	1	1	1
New Mexico	54		32	9				95		95	78	39	522,888	256	142	+ 80.3	1,349,285	659,051	204	169	129
New York	53				34			87		87	63	42	121,331	196	114	+ 71.9	274,724	159,718	85	73	71
North Dakota	3			2				5		5	1	1	41,307	6	1	+500.0	49,902	5,609	15	13	2
Ohio	36		19	38				93		93	53	71	192,813	213	198	+ 7.6	471,785	421,961	147	144	123
Oklahoma	237	1	12	180	1	1	2	434	12	446	483	412	1,608,778	1,417	1,348	+ 5.1	5,157,109	4,875,999	610	608	575
Pennsylvania	62		25	7	55	11		160		160	113	103	275,119	379	292	+ 29.8	658,513	528,938	214	219	219
South Dakota																			2	2	
Tennessee																			6	7	6
Texas	1,069	15	88	572	3			1,747	25	1,772	1,288	1,537	8,509,826	4,753	4,225	+ 12.5	22,847,672	17,864,873	1,880	1,862	1,534
Dist. 1 S. Central	19	2	5	31				57		57	62	54	195,445	173	155	+ 11.6	540,587	397,950	55	42	43
Dist. 2 Middle Gulf	27	3	11	36				77		77	64	75	494,678	212	191	+ 11.0	1,348,240	1,076,657	68	68	56
Dist. 3 Upper Gulf	92	7	2	48				149	2	151	123	124	962,364	453	356	+ 27.2	2,944,982	2,193,732	162	162	141
Dist. 4 L. Gulf-S.W.	80	2	15	64				161	1	162	127	148	821,979	442	392	+ 12.8	2,240,587	1,983,020	118	113	124
Dist. 5 E. Central	18		4	12	1			35		35	26	56	204,205	101	124	— 18.6	546,153	410,566	27	30	35
Dist. 6 Northeast	21		2	21				44		44	46	72	270,855	140	171	— 18.1	899,917	848,426	42	50	34
Dist. 7-B N. Cent.	144	1	3	116				264	2	266	207	193	912,397	692	577	+ 19.9	2,260,318	1,616,826	187	184	185
Dist. 7-C W. Cent.	185		2	52				239	3	242	133	144	1,439,851	606	347	+ 74.6	3,586,147	1,405,472	291	289	145
Dist. 8 West	296		3	48				347	16	363	224	349	2,082,929	967	983	— 1.6	5,491,963	5,232,723	503	517	463
Dist. 9 North	145		1	123	2			271	1	272	259	264	806,678	789	715	+ 10.3	2,417,703	2,058,483	301	288	225
Dist. 10 Panhandle	42		40	21				103		103	17	58	318,447	178	214	— 16.8	571,075	641,018	126	129	83
Utah	2			5				7	1	8	7		45,177	17	5	+240.0	98,746	13,537	23	28	14
Virginia																				1	2
West Virginia	10		36	5				51		51	65	40	145,242	143	176	— 18.8	406,773	506,414	195	201	200
Wyoming	38			20				58	2	60	48	68	315,703	147	162	— 9.3	748,715	826,669	90	81	92
Total U.S.	2,228	24	270	1,314	93	12	8	3,949	52	4,001	3,280	3,412	16,774,238	11,087	9,891	+ 12.1	46,069,319	37,743,089	5,092	5,015	4,435

It's the THIRD Ingredient that Pinpoints the Picture



1. The **GAMMA RAY** Curve identifies formations

2. The **NEUTRON** Curve points out where you'll find fluid in the formations

The THIRD ingredient is Lane-Wells **ACCURACY**

ACCURATE DEPTH MEASUREMENTS with Lane-Wells' famous measuring system, to assure you an accurate picture of the depths and extent of all formations logged.

SKILLED INTERPRETATION if you wish it, with experience gained in thousands of radioactivity well logging jobs in every drilling area in this country and many fields abroad.

You get ALL THREE in Radioactivity Well Logging by...

20 years of Progress through Service

Tomorrow's Tools - Today!

LANE WELLS

ORIGINAL SERVICE COMPANY • RADIOACTIVITY WELL LOGGING

General Offices, Export Office, Plant • 5610 So. Soto St., Los Angeles 58

LOS ANGELES • HOUSTON • OKLAHOMA CITY • LANE-WELLS CANADIAN CO. IN CANADA • PETRO-TECH SERVICE CO. IN VENEZUELA

Competition Keen Among Refiners

Small Concerns Process Nearly Million Barrels of Crude Daily; 27 Larger Companies Run 86.5 Percent of Total

ALTHOUGH refining of petroleum in the U. S. is concentrated among much fewer companies and areas than is production, there is nevertheless a division of the country's refinery operations among hundreds of companies and plants, which must engage in keen competition to maintain or increase their volumes of business.

The largest U. S. refiner accounts for about 11 percent of crude runs to stills at domestic refineries, the four next largest account for 7 to 8 percent each, and three others for 5 to 6 percent. Below the top eight refiners are approximately a dozen companies that refine 1 to 4 percent of the national total each and one-half dozen substantial refiners whose runs are ¼ of 1 percent to 1 percent of the U. S. total. This latter group grades down to companies in the 10,000 barrels per day class for refinery runs and/or crude production.

As shown in a table herewith, 27 companies ran to stills in 1951 an average of 5,617,750 barrels of crude per day, or 86.5 percent of the total U. S. runs of 6,494,258 barrels daily. The remainder of the industry, composed of many small companies operating small plants throughout the country, processed close to 1 million barrels of crude per day, having shown aggregate runs to stills of 876,508 barrels daily, or 13.5 percent of the U. S. total.

All of the 27 listed companies are integrated concerns, having both refining and crude production, and 25 of them have refinery runs and crude production of approximately 20,000 barrels per day or more, while the two smallest have runs and production in the order of 10,000 to 15,000 barrels daily.

Domestic Refinery Runs and Crude Oil Production of U. S. Companies in 1951

(Data from all available annual reports of U. S. companies with refinery runs and/or crude production above 10,000 barrels daily.)

COMPANY and RANK	CRUDE RUNS TO STILLS			CRUDE OIL PRODUCTION	
	Total Barrels	Barrels Daily	Percent of U.S.	Barrels Daily	As Percent of Runs to Stills
All Companies (U.S. Total)	**2,370,404,000**	**6,494,258**	**100.00**	**6,149,394**	**94.7**
(1-A) Standard (N.J.) U.S. Affiliates, Total	278,495,000	763,000	11.75	407,000	53.3
1. Standard (N.J.) Net Share of U.S. Affiliates	253,282,260	693,924	10.68	309,508	44.6
72% of Humble O. & R. Co.	64,832,760	177,624	2.73	250,695	141.1
Wholly Owned Subsidiaries	188,449,500	516,300	7.95	58,813	11.4
Esso Standard Oil Co.	182,500,000	500,000	7.70	.....	.....
Carter Oil Co.	5,949,500	16,300	0.25	58,813	360.8
2. Socony-Vacuum Oil Co.	189,991,000	520,523	8.02	208,510	40.1
3. Standard Oil Co. (Indiana)	187,646,500	514,100	7.92	242,000	47.1
4. The Texas Co.	178,946,655	490,265	7.55	294,776	60.1
5. Gulf Oil Corp.	169,089,535	463,259	7.13	233,133	50.3
6. Shell Oil Co.	142,083,000	389,268	5.99	236,222	60.7
7. Standard Oil Co. of Calif.	138,515,189	379,494	5.84	273,502	72.1
8. Sinclair Oil Corp.	129,759,265	355,505	5.47	102,790	28.9
9. Humble Oil & Refining Co.	90,045,500	246,700	3.80	348,187	141.1
10. Cities Service Co.	75,517,000	206,896	3.19	89,970	43.5
11. Sun Oil Co.	74,895,160	205,192	3.16	104,664	51.0
12. Phillips Petroleum Co.	68,277,135	187,061	2.88	114,809	61.4
13. Atlantic Refining Co.	63,341,370	173,538	2.67	87,068	50.2
14. Tide Water Associated Oil Co.	61,315,970	167,989	2.59	95,891	57.1
15. Union Oil Co. of Calif.	47,307,000	129,608	2.00	87,690	67.7
16. Standard Oil Co. (Ohio)	43,402,228	118,910	1.83	32,038	26.9
17. Pure Oil Co.	39,641,944	108,608	1.67	73,693	67.9
18. Richfield Oil Corp.	37,141,000	101,756	1.57	58,633	57.6
19. Continental Oil Co.	32,529,895	89,123	1.37	114,551	128.5
20. Mid-Continent Petroleum Corp.	19,124,014	52,395	0.81	19,120	36.5
21. Skelly Oil Co.	15,487,138	42,431	0.65	63,746	150.2
22.*Plymouth Oil Co.	13,620,000	37,315	0.57	19,420	52.0
23. Sunray Oil Corp.	13,555,528	37,138	0.57	72,966	196.5
24. The Ohio Oil Co.	13,296,936	36,430	0.56	92,616	254.2
25. Lion Oil Co.	8,271,310	22,661	0.35	19,215	84.8
26. Deep Rock Oil Corp.	6,141,000	16,825	0.26	8,142	48.4
27. South Penn Oil Co.	3,087,900	8,460	0.13	11,438	135.2
† Total, 27 Companies	2,050,478,672	5,617,750	86.50	3,163,603	56.3
Remainder of Industry	319,925,328	876,508	13.50	2,985,791	340.6
Total, United States	2,370,404,000	6,494,258	100.00	6,149,394	94.7

* Through wholly owned subsidiary, Republic Oil Refining Co., which has plant at Texas City, Texas.

† Includes 100% of Humble as one company and Standard (N.J.) wholly owned subsidiaries, Esso Standard and Carter, as one company.

Positions Change

Competition among refiners was evidenced in changes in rank for several companies for 1951, as compared with their standing in the industry in 1950. (WORLD OIL, June, 1951, page 68; also see June, 1950, page 44.) As a group, the larger companies accounted for a somewhat lower percentage of U. S. refinery runs in 1951 than they did in 1950, and a considerable number of individual companies showed such a result. Among the companies that improved their rating in the industry in 1951 as compared with 1950 were Standard Oil Company of California, Phillips Petroleum Company, Plymouth Oil Company, and The Texas Company, the latter having temporarily lost rank in 1950 because of strikes. Companies that showed losses in rank among other refiners in 1951 included Sinclair Oil Corporation, Tide Water Associated Oil Company, and The Ohio Oil Company, despite the fact that each of those concerns processed more crude than in 1950.

Standard Oil Company (New Jersey) has continued as the country's largest refiner. Its net share in the refinery runs of domestic subsidiaries averaged 693,924 barrels daily, or 10.68 percent of the total U. S. runs to stills. This includes all the runs of the wholly owned subsidiaries, Esso Standard Oil Company and Carter Oil Company, and 72 percent of the

runs of Humble Oil & Refining Company, of which Standard owns that percentage. The wholly owned subsidiaries themselves accounted for refinery runs of 516,300 barrels daily, or 7.95 percent of the national total, almost enough to rank Standard as No. 1 refiner even without including its large share in Humble.

Socony-Vacuum Oil Company remained the second largest U. S. refiner, with crude runs to stills of 520,523 barrels daily, equivalent to 8.02 percent of the U. S. total.

Standard Oil Company (Indiana), large supplier of products in the Midwest, continued to crowd Socony-Vacuum in rank but remained third largest refiner, with runs of 514,100 barrels daily, which represented 7.92 percent of the nation's runs to stills.

After having had its runs retarded in 1950 by plant shutdowns due to strikes, The Texas Company, nationwide marketer, rose back to fourth place among U. S. refiners in 1951. Its runs of 490,265 barrels daily were 7.55 percent of the U. S. total.

Gulf Oil Corporation rated fifth in refining in 1951, with crude runs to stills averaging 463,259 barrels per day, or 7.13 percent of the industry total.

Other Ratings

After Gulf came Shell Oil Company, Standard Oil Company of California, and Sinclair Oil Corporation, with refinery runs between 400,000 and 350,000 barrels daily or between 6 and 5½ percent of the industry total.

Humble Oil & Refining Company, considered apart from its parent company, Standard of New Jersey, rated as the country's ninth largest refiner, besides being the largest producer of crude. Its refinery runs of 246,700 barrels daily were 3.80 percent of the U. S. total.

Cities Service Company and Sun Oil Company rated tenth and eleventh in refining, with runs slightly above 200,000 barrels or 3 percent of the industry total. Phillips Petroleum Company, Atlantic Refining Company, and Tide Water Associated Oil Company rated No. 12, 13, and 14, with runs between 200,000 and 150,000 barrels daily or between 3 and 2½ percent of the U. S. total. Union Oil Company of California was No. 15, with runs of 129,608 barrels daily, or 2 percent of the industry total.

Reports Show Who Drills Wells

Large Companies Account for 27 Percent Completed

And Independent Operators Drill 73 Percent

SMALL companies, independent operators and drilling contractors currently drill approximately 73 percent of the wells being completed in the United States, while major companies account for approximately 27 percent.

The smaller concerns and individuals do an even greater proportion of wildcatting, drilling about 80 percent of all exploratory wells, as compared with 20 percent for the large companies.

These figures are indicated by data from annual reports of U. S. oil companies for 1951 as shown in the accompanying table.

Approximately 12,052 wells net were completed in 1951 by 31 companies with crude oil production and/or refinery runs above 10,000 barrels daily. These 12,052 wells represented 26.9 percent of the 44,826 new wells completed during the year in the U. S. The remaining 32,774 new wells, or 73.1 percent of the total, were drilled by thousands of small companies, partnerships, drilling contractors and individuals.

Similarly the 31 larger companies that produced and/or refined 10,000 barrels of crude per day drilled approximately 2181 exploratory wells, or 20.2 percent of the U. S. total of 10,793 tests seeking to open new pools. The independent operators and small concerns meanwhile did the great bulk of the exploratory drilling, having accounted for about 8612 wells or 79.8 percent of the U. S. total.

For the 31 larger companies, the aggregate of 2181 exploratory wells represented 18.1 percent of the total of 12,052 wells drilled by those companies. For the independents comprising the remainder of the industry, the 8612 total exploratory wells represented 26.3 percent of their combined 32,774 total completions. For the industry as a whole, embracing the large and small companies, the total of 10,793 exploratory wells represented 24.1 percent of the total of 44,826 new well completions.

Although independents do a large proportion of exploratory drilling in the U. S., they are materially aided and encouraged in their work by the larger companies. In addition to the wells they drilled or participated in drilling in 1951, some of the larger companies reported spending substantial amounts of "dry hole" money, contributing toward costs of wells drilled by others, in exchange for resultant information bearing on the value of leases held in the same areas. In this way the larger companies contributed toward financing numerous wells drilled by independents, and to that extent the work of the independents was facilitated.

Wells drilled in 1951 by individual companies were closely proportional to the crude oil production and producing wells of those companies. As in 1950, Humble Oil & Refining Company, largest domestic producer and among the largest in ownership of producing wells, continued to drill more wells than any other company. Its 1133 completions included 148 exploratory wells, which were 13.1 percent of the total. Several other companies showed higher totals or percentages than these in their exploratory completions.

The Texas Company, second largest producer, likewise continued to drill the second largest number of wells. Its 1106 completions almost equaled those of Humble, and Texas was first in the industry in exploratory drilling. Its 294 exploratory well completions represented 26.6 percent of its total completions. This ratio was somewhat higher than for the industry as a whole and slightly higher than for independent operators.

Standard Oil Company (Indiana), fourth in production and near the top in producing wells, was third in number of wells drilled in 1951, the same situation as in 1950. The company's

percent of its total completions, about the same ratio as that of Humble.

Socony-Vacuum Oil Company was fourth in number of wells completed but devoted only 7.4 percent of its drilling to exploration. A large part of its drilling was done by its Mid-Continent subsidiary, Magnolia Petroleum Company, and the remainder by the West Coast subsidiary, General Petroleum Corporation.

Gulf Oil Corporation ranked fifth in U. S. drilling, Sinclair Oil Corporation sixth, Sun Oil Company seventh, Continental Oil Company eighth, and Phillips Petroleum Company ninth. Shell Oil Company and The Ohio Oil Company came next and then Standard Oil Company of California, Cities Service Company, South Penn Oil Company, and in 15th place, Skelly Oil Company. Atlantic Refining Company was 16th, followed by Sunray Oil Corporation, Standard Oil Company (Ohio), Union Oil Company of California, and Amerada Petroleum Corporation was 20th.

Number of Wells Completed in 1951 by U. S. Companies

(Data from all available annual reports of U. S. companies with crude production and/or refinery runs of 10,000 barrels daily.)

COMPANY AND RANK	[1]SUMMARY OF WELLS DRILLED IN U.S. IN 1951		DETAILS OF ALL WELLS DRILLED IN 1951					
				PRODUCTIVE				
	Gross Wells	Net Wells	[1]Class of Wells and Basis Reported	Oil	Gas (& Cond.)	Total Prod.	Dry	Total Drilled
1. Humble Oil & Refining Co.	1316	1133[2]	Gross wells drilled	....	....	....	....	1316
			Net wells paid for	....	....	....	....	....
			Drilled by Humble, Total	....	....	893	240	1133
			Exploratory	....	....	38	110	148
			Wildcats	....	....	25	....	....
			New Pay Tests	....	....	13	....	....
			Development	....	....	855	130	985
			Part-interest wells drilled by others	....	....	..	....	183
2. The Texas Co.	1285	1106[2]	Gross wells drilled	....	....	....	....	1285
			Drilled by Texas Co., Total	....	....	....	....	1106
			Exploratory	....	....	92	202	294
			Development	....	....	....	....	812
			Part-interest wells drilled by others	....	....	....	....	179
3. Standard Oil Co. (Indiana)	1103	828	Gross wells drilled	721	169	890	213	1103
			Exploratory	40	9	49	103	152
			Development	681	160	841	110	951
			Net wells drilled	529	142	671	157	828
4. Socony-Vacuum Oil Co.	853	784	U.S. wells, basis not shown	....	....	677	107	784
			Exploratory	....	....	24	34	58
			Development	....	....	653	73	726
			Magnolia Pet. Co. wells, gross	....	....	....	....	780
			General Pet. Corp., wells, gross	....	....	....	....	73
5. Gulf Oil Corp.	804	....	Gross wells, U.S. and foreign	....	....	....	....	1100
			Gross wells in U.S.	....	....	....	....	804
			Exploratory, gross	....	....	26	118	144
			Drilled by Gulf	....	....	....	....	81
			Drilled by others	....	....	....	....	63
			Wildcats	13	1	14	....	....
			New Pay Tests	....	....	12	....	....
			Development, Gross	....	....	554	106	660
			Gross wells, Foreign	....	....	....	....	296
			Venezuela, Total	182	3	185	18	203
			Exploratory	10	1	11	6	17
			Development	172	2	174	12	186
			Kuwait, gross	20	....	20	....	20
			Canada, Total	....	....	....	....	68
			Exploratory	2	1	3	12	15
			Development	....	....	....	....	53
			Other Foreign	....	....	....	....	5
6. Sinclair Oil Corp.	....	671	Net wells in U.S.	535	19	554	117	671
			Wells in Venezuela	6	....	6	1	7
7. Sun Oil Co.	600	538	Gross wells drilled	....	....	....	....	600
			Drilled by Sun, Total	343	27	370	168	538
			Exploratory	57	19	76	106	182
			Development	286	8	294	62	356
			Part-interest wells drilled by others	29	12	41	21	62
			Others' exploratory wells aided	....	....	....	....	201
8. Continental Oil Co.	716	534	Gross wells	....	....	....	....	716
			Net wells, Total	351	22	373	161	534
			Exploratory	25	6	31	93	124
			Development	326	16	342	68	410
9. Phillips Petroleum Co.	639	....	Gross wells drilled	489	77	566	73	639
			Exploratory	8	4	12	28	40
			Development	481	73	554	45	599
			Others' exploratory wells aided	....	....	....	....	202
10. Shell Oil Co.	573[3]	....	Total (incl. Canada) basis not shown	447	34	481	92	573
			Exploratory	....	....	....	....	92
			Development	....	....	....	....	481
11. The Ohio Oil Co.	569	....	Gross wells, Total	....	....	....	....	569
			Oil, gas, dry	358	17	375	83	458
			Exploratory	7	....	7	41	48
			Development	351	17	368	42	410
			Input wells	....	....	....	....	111

■ Table Continued on Next Page

Number of Wells Completed in 1951 by U. S. Companies

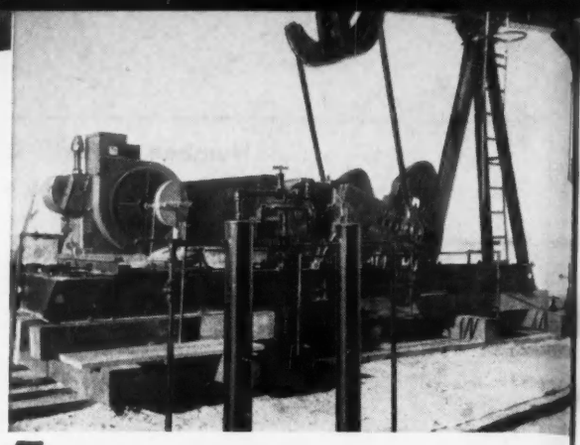
(Data from all available annual reports of U. S. companies with crude production and/or refinery runs of 10,000 barrels daily.)

■ Continued from Preceding Page

COMPANY AND RANK	[1]SUMMARY OF WELLS DRILLED IN U.S. IN 1951		DETAILS OF ALL WELLS DRILLED IN 1951					
				PRODUCTIVE				
	Gross Wells	Net Wells	[1]Class of Wells and Basis Reported	Oil	Gas (& Cond.)	Total Prod.	Dry	Total Drilled
12. Standard Oil Co. of Calif.	....	468	Net wells, U.S. and foreign	....	....	460	....	....
			Net wells in U.S., total	....	....	....	....	468
			Exploratory	....	....	18	63	81
			Development	....	....	....	....	387
13. Cities Service Co.	....	470—	Net wells (incl. few in Canada)	259	129	388	82	470
			Exploratory, gross	17	4	21	42	63
			Development, approx.	242	125	367	40	407
14. South Penn Oil Co.	....	412	Net wells, total	....	....	....	....	412
			Exploratory	....	8	8	3	11
			Development	....	....	....	....	401
			Oil	181	....	....	....	181
			Intake	....	....	....	....	220
15. Skelly Oil Co.	467	379	Net wells completed	260	38	298	81	379
16. Atlantic Refining Co.	....	270	Net wells, U.S. and foreign	216	35	251	77	328
			Net wells in U.S.	....	....	222	48	270
			Exploratory	....	....	16	28	44
			Development	....	....	206	20	226
			Net wells, foreign	....	....	29	29	58
			Venezuela	....	....	21	9	30
			Other foreign	....	....	8	20	28
17. Sunray Oil Corp.	410	261	Gross wells	282	33	315	95	410
			Net wells	....	....	204	57	261
18. Standard Oil Co. (Ohio)	312	226	Gross wells, total	....	....	221	81	312
			Exploratory	15	7	22	64	86
			Development	....	....	199	27	226
			Net wells, total	....	....	171	55	226
			Exploratory	....	....	11	38	49
			Development	156	4	160	17	177
19. Union Oil Co. of Calif.	272[3]	....	Total, basis not shown	....	....	166	106	272
20. Amerada Petroleum Corp.	251	....	Gross wells	162	14	176	75	251
21. Carter Oil Co.	....	203	Total wells drilled	....	....	....	....	202
22. Lion Oil Co.	221	192	Gross wells, total	160	7	167	54	221
			Exploratory	....	....	8	31	39
			Development	....	....	159	23	282
			Net wells	148	3	151	41	192
23. Tide Water Associated Oil Co.	....	187	....	....	....	163	24	187
24. Pure Oil Co.	....	150	Wells excl. service	....	....	....	....	150
25. Deep Rock Oil Corp.	206	....	Gross wells, total	....	....	123	83	206
			Primary wells	....	....	50	83	133
			Exploratory	6	1	7	31	38
			Development	....	....	116	52	168
			Waterflood wells	....	....	73	....	73
26. Mid-Continent Pet. Corp.	199	....	Gross wells, total	....	....	....	....	199
			Exploratory	....	....	12	27	39
			Development	....	....	....	....	160
			Full interest wells	....	....	....	....	133
			Primary	68	7	75	36	111
			Secondary	....	....	....	....	22
			Partnership	....	....	....	....	66
			Oil, gas, dry	30	9	39	21	60
			Service	....	....	....	....	6
27. Texas Pacific Coal & Oil Co.	....	111	Total wells	....	....	....	....	111
			Oil, gas, dry	77	4	81	27	108
			Service wells	....	....	....	....	3
28. Richfield Oil Corp.	....	94+	Net productive wells	....	....	94	....	94+
29. United Gas Corp. (Union Producing Co.)	103	....	Gross wells drilled	54	31	85	18	103
			Exploratory	3	2	5	8	13
			Development	51	29	80	10	90
			Drilled by Co. for self and others	49	23	72	17	89
			Part int. wells drilled by others	5	8	13	1	14
30. Plymouth Oil Co.	92	....	Total, basis not stated	....	....	71	21	92
Houston Oil Co. of Texas	128	70	Gross wells	74	25	99	29	128
			Exploratory	4	3	7	19	26
			Net wells	....	....	....	....	70
Total 31 Companies	....	....	Net wells, total	....	....	....	....	12,052[4]
			(Percent of U.S.)	....	....	....	....	26.9
Rest of industry	....	....	New wells, total	....	....	....	....	32,774
			(Percent of U.S.)	....	....	....	....	73.1
Total, U.S.	....	....	New wells, total	....	....	....	....	44,826
Total 31 companies	....	....	Exploratory wells	....	....	....	....	2,181[5]
			(Percent of U.S.)	....	....	....	....	20.2
Rest of industry	....	....	Exploratory wells	....	....	....	....	8,612
			(Percent of U.S.)	....	....	....	....	79.8
Total, U.S.	....	....	Exploratory wells	....	....	....	....	10,793

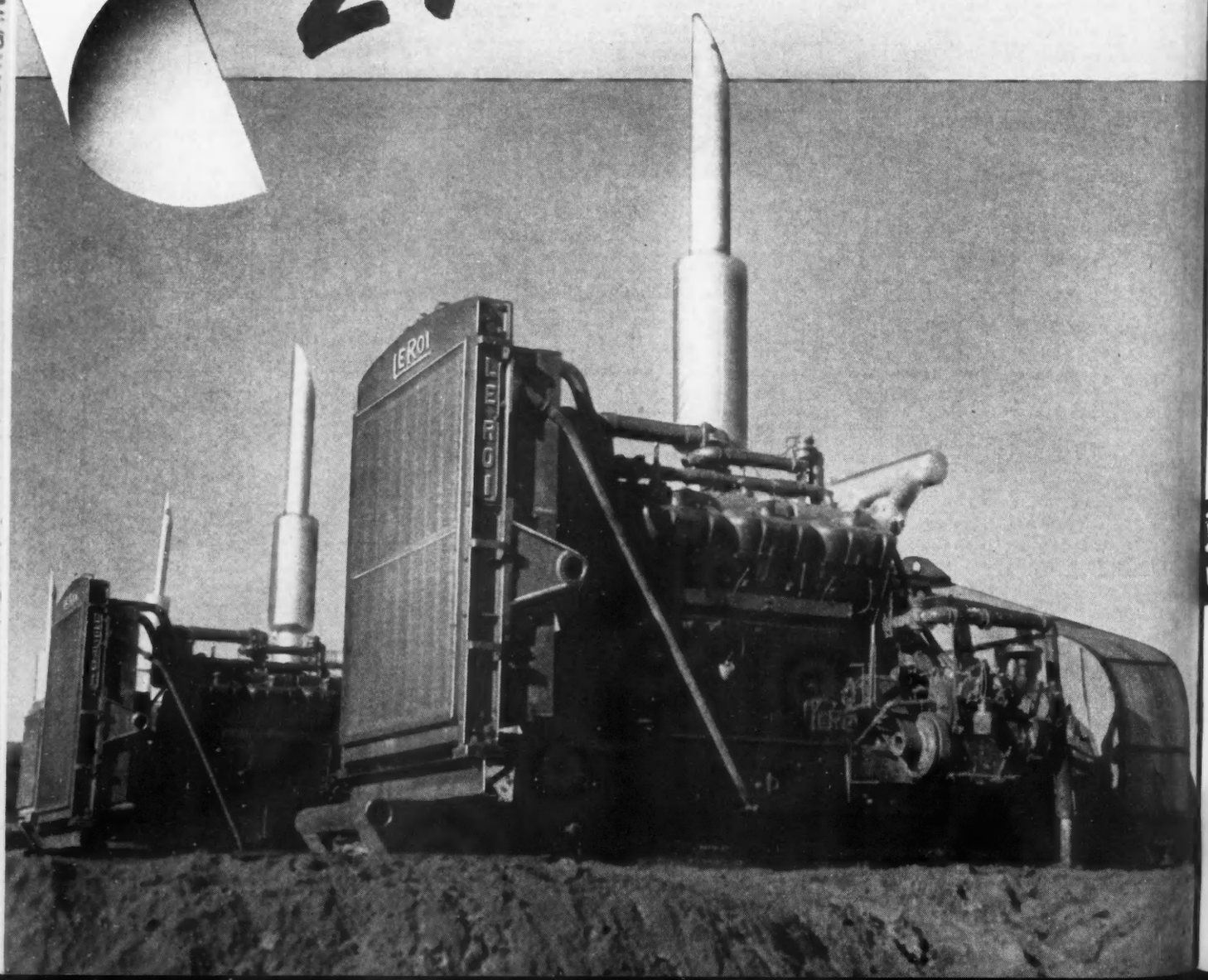
[1] Gross wells are all wells in which company held whole or part interest; net wells include wholly owned wells and only company's share in part interest wells. [2] Wells drilled by company; does not include part interest wells drilled by others. [3] Not shown if gross or net. [4] For 10 companies that apparently reported only gross wells, net wells are here estimated as 80 percent of gross; this ratio being indicated by reports showing both gross and net wells. [5] For 11 companies that reported only total wells, exploratory wells are here estimated as 18.1 percent of total; this ratio being indicated by reports showing both total and exploratory wells.

Le Roi 3 way Partnership

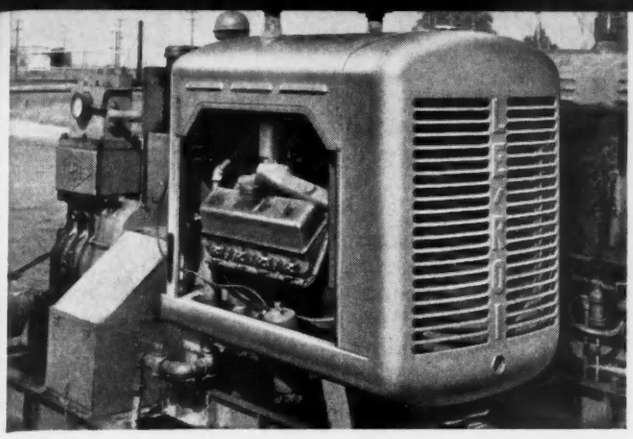


1 Better Engines. An example is the mode Roi A288 well-pumping engine located at a major oil pany's lease in Oklahoma City. This engine has run 282 HP-hours at about one half the cost per HP-hour the com considers a good average. That's typical of Le Roi's pro sive design policy to meet your problems.

24-hour-a-day



MICHIGAN LIBRARIES



2 Better Applications. Exclusive Le Roi distributors and factory men are oil-field power specialists. They know engines and how to recommend best operating speeds and accessory combinations to give you low-cost, lasting power.

3 Better Service. Keeping your Le Roi engines running is the sole responsibility of our distributors and Tulsa branch-office staff. Parts on hand when you need them, top-notch service men on 24-hour call, and unexcelled overhaul facilities assure your getting the most out of Le Roi oil field engines.

service for 5 years

in sour gas...never overhauled

That's Le Roi performance at this pipeline booster station, under most difficult operating conditions in district

And Le Roi's are still going strong — pumping 27,000 barrels daily, to hold 1,000 psi line pressure.

At this booster station — owned by a major pipeline company — the top-notch performance of one Le Roi F1500 led to the purchase of two more F1500's and two Le Roi L3000's.

Though one of these engines is now almost five years old, none have needed overhauling to date — and only very little maintenance has been required. This trouble-free performance has been achieved in spite of unfavorable conditions — dust, heat, and corrosive sour gas.

Because Le Roi's help keep operating expenses to a minimum, installations are being made for pipeline and other oil-field service in an ever-increasing number.

No matter what your engine application, it pays you to find out about Le Roi oil-field power from your nearby Le Roi distributor or supply house. They can show you Le Roi engines at work under conditions similar to yours, and explain the benefits of Le Roi's 3-way partnership.

LE ROI COMPANY

MILWAUKEE 14, WISCONSIN
Plants: Milwaukee • Cleveland • Greenwich, Ohio
Oil Field Headquarters: Tulsa, Oklahoma

See these Le Roi Distributors for a Profitable 3-way Partnership

Oklahoma
Le Roi Company Branch — Tulsa
Carson Machine & Supply Co.— Oklahoma City

East & South Texas, Gulf Coast
Southern Engine and Pump Company — Houston, Kilgore, Edinburg, Dallas, San Antonio, Corpus Christi, Texas, and Lafayette, Houma, Louisiana.

North & West Texas, New Mexico
General Machine & Supply Co. — Odessa, Snyder, Texas.
Nortex Engine & Equipment Co.—Wichita Falls, Texas.

Kansas
Carson Machine and Supply Co.—Great Bend

Illinois — Western Kentucky
Western Machinery & Engine Company—Centralia, Illinois and St. Louis, Missouri.

Michigan
Hafer Engine Service — Reed City

Rocky Mountain Area
Gehring Equipment Co. — Casper, Wyoming, Rangeley, Col.

Northern Louisiana & Mississippi
Ingersoll Corporation — Shreveport, Louisiana, and Jackson, Mississippi.

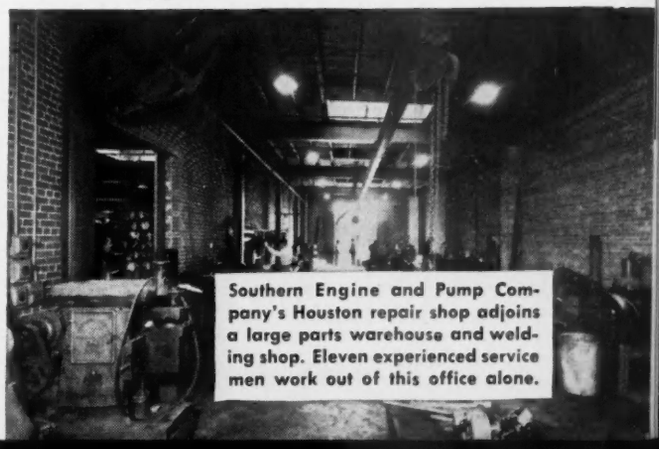
West Coast
Le Roi-Rix Machinery Co. — Los Angeles, Long Beach and Bakersfield, Calif.

Appalachian Area
P. C. McKenzie Co., Pittsburgh, Bradford.

Canada
Lucey Export Ltd. — Calgary, Edmonton, Alberta.

P-113

Typical LE ROI service facility



Southern Engine and Pump Company's Houston repair shop adjoins a large parts warehouse and welding shop. Eleven experienced service men work out of this office alone.

U.S. Oil Produced By Many Firms

Small Producers in Aggregate Account for 2.4 Million Barrels Daily or Two-Fifths of National Output in '51

By L. J. LOGAN
WORLD OIL Staff

CRUDE OIL production in the United States is participated in by many companies and operators, being so vast an enterprise that even the largest producing concerns, with assets of $1 billion or more each, individually account for only around 5 percent or less of the national total.

Approximately two-fifths of the industry's production is contributed by some 18,000 or more small companies, partnerships and individuals, mostly having less than 10,000 barrels per day of production and predominantly having less than 5000 barrels daily output. These independent operators in 1951 produced close to one billion barrels of crude oil, having averaged a combined output of about 2,404,059 barrels daily, or 39.1 percent of the U. S. total of 6,149,394 daily.

These figures are indicated in the accompanying table showing production, producing wells and acreage of the larger companies in the industry, as reported in their annual reports for 1951.

Gross crude production of about 3,745,335 barrels daily, or 60.9 percent of the U. S. total, was indicated for 31 larger companies. They included the major integrated companies, some relatively large producing companies and several smaller integrated companies, with crude production and/or refinery runs of more than 10,000 barrels per day each. Those 31 companies reported net crude production, excluding royalty and co-owner interests, aggregating 3,277,168 barrels daily, or 53.3 percent of the U. S. total. This combined total of net production represented only about seven-eighths of the gross production of the 31 companies, which together are indicated to have produced also about 468,167 barrels per day for the accounts of landowners and other royalty owners, with such interests representing about one-eighth of their gross production.

The proportion of the nation's production accounted for by the larger companies in 1951 was about the same as in 1950, as reported in WORLD OIL of June, 1951, Page 62.

The largest producer of U. S. crude produced for its own account 5.66 percent of the country's production in 1951, a somewhat higher proportion than in the two previous years. This was Humble Oil & Refining Company, with net production averaging 348,187 barrels daily, compared with 282,501 daily in 1950 and 275,900 daily in 1949. The sharp increase for 1951 was partially explained by a precipitous rise in total U. S. production, in which Humble participated prominently.

It is interesting that Humble outranked even its parent company, Standard Oil Company (New Jersey) in net crude production. Standard owns 72 percent of Humble's stock, and thereby had domestic net production of 250,695 barrels daily in addition to the 58,813 barrels daily of its wholly-owned subsidiary, Carter Oil Company. That was a total of 309,508 barrels daily of net production for Standard of New Jersey, equivalent to 5.03 percent of the U. S. total. If Humble is excluded from consideration separately and is included with Standard, then Standard would rate as the No. 1 U. S. producer.

The Texas Company steadily held its position as the second largest domestic producer. Its 294,776 barrels daily of net production in the U. S. represented 4.79 percent of the national total. In 1950 the company had produced 258,217 barrels daily, or 4.78 percent of the U. S. total.

Standard Oil Company of California remained third in domestic production in 1951 as in 1950. Its net production of 273,502 barrels daily in 1951 was 4.45 percent of the U. S. total, and this was an increase over the 246,533 barrels daily of 1950.

Standard Oil Company (Indiana) approximately maintained its 1950 proportion of national production in averaging 242,000 barrels net production per day in 1951, equivalent to 3.94 percent of the industry total. In 1950, Standard of Indiana produced 214,050 barrels daily.

Shell Oil Company showed a noteworthy increase in net production to 236,222 barrels daily in 1951, which put it into fifth place. This was 3.84 percent of U. S. total production. In 1950, Shell had been in sixth place, producing 197,852 barrels daily, or 3.66 percent of the industry total.

Gulf Oil Corporation increased its net domestic production to 233,133 barrels daily in 1951, or 3.79 percent of the U. S. total, as in 1950, but did not quite stay ahead of Shell, and dropped into sixth place, compared with fifth the previous year. In 1950, Gulf's net production in the U. S. was 204,479 barrels daily.

Socony-Vacuum Oil Company increased its domestic net production to 208,510 barrels daily, or 3.39 percent of the U. S. total, in 1951 from 180,822 daily, or 3.35 percent of U. S. in 1950. Socony-Vacuum thereby remained seventh in production as in the previous year. The company's wholly-owned subsidiary, Magnolia Petroleum Company, operating east of the Rockies, had sufficient production itself to rank as No. 7 producing company, by considering it separately. Its net production of 163,260 barrels daily was 2.65 percent of the industry total. The remainder of Socony-Vacuum's production was accounted for by General Petroleum Corporation, wholly-owned subsidiary operating on the West Coast and in the Rocky Mountain states. General Petroleum produced 45,250 barrels daily.

Phillips Petroleum Company and Continental Oil Company in 1951 were No. 8 and No. 9, respectively, among the producing companies. Phillips had been a little ahead of Continental in 1949, but in 1950, Continental spurted ahead of Phillips. Crude production of Phillips in 1951 averaged 114,809 barrels daily, or

1.87 percent of the U. S. total. Continental's net production of 114,551 barrels daily was 1.86 percent of the national total.

Not far behind Phillips and Continental in 1951 was Sun Oil Company, with net crude oil production averaging 104,664 barrels daily, or 1.70 percent of the industry total. This output made Sun the tenth largest U. S. producer, the same ranks as in 1950.

Sinclair Oil Corporation remained No. 11, as in the previous year, by producing 102,790 barrels of crude per day in 1951, or 1.67 percent of the U. S. total.

Tide Water Associated Oil Company showed a noteworthy improvement in its rank as a producer, going into No. 12 position in 1951 from No. 15 in 1950, by averaging 95,891 barrels daily, or 1.56 percent of U. S.

The Ohio Oil Company also improved its rank, having risen to the No. 13 position in 1951 from No. 14 in 1950, by producing 92,616 barrels daily, or 1.51 percent of U. S.

Cities Service Company ranked as No. 14 producer in 1951, with output of 89,970 barrels daily, or 1.46 percent of the U. S. total. This represented a decline from rank as No. 12 producer in 1950, despite production higher than the 83,910 barrels daily of 1950.

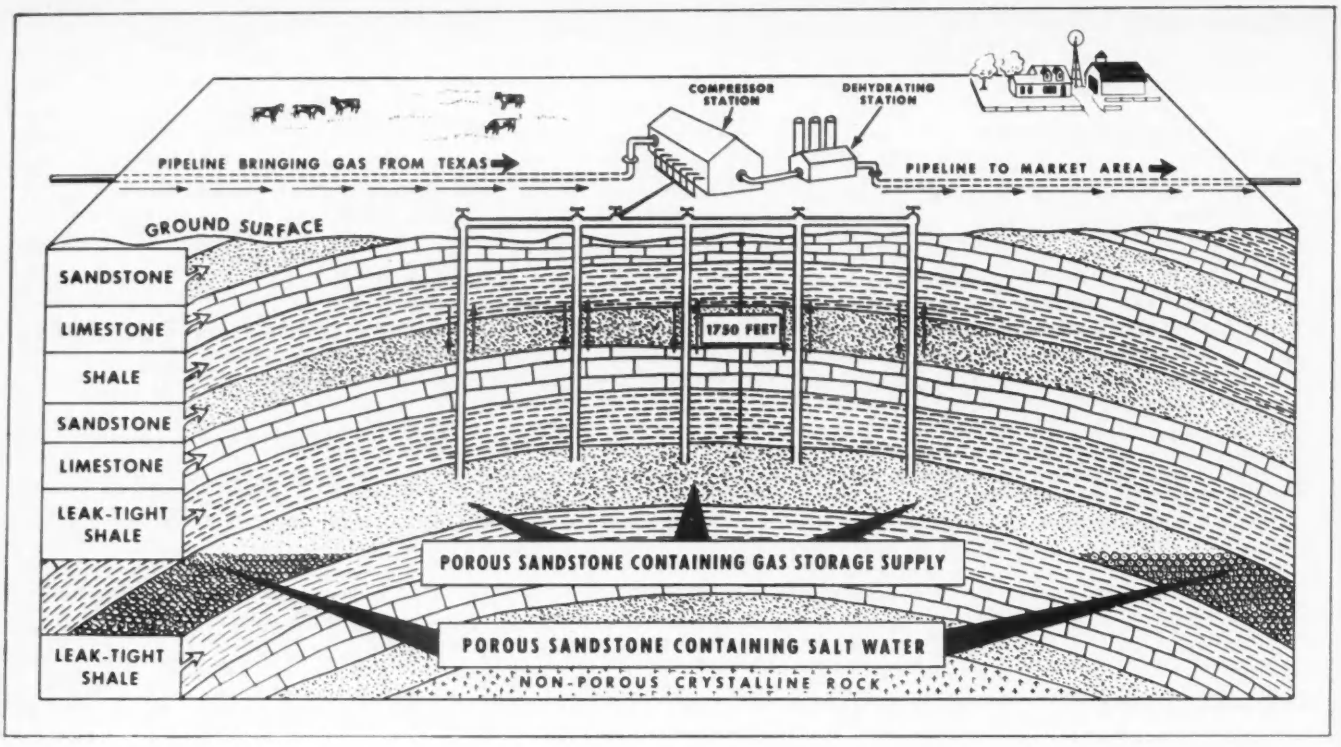
No. 15 among producers in 1951 was Union Oil Company of California, with output of 87,690 barrels daily, or 1.43 percent of the U. S. total. This was an improvement in rank, as compared with the No. 16 position held in 1950.

Domestic Crude Oil Production of U. S. Companies in 1951 and Wells and Acreage Held at End of Year

(Data from all available annual reports of U. S. companies with crude production and/or refinery runs above 10,000 barrels daily.)

COMPANY and RANK	Net Domestic Crude Oil Production (Company's Net Share: Does Not Include Royalty and Co-Owner Interests			Wells, Producing, End of Year (Net Wells Owned in U.S. Except As Indicated)			Acres of Leases and Fee Lands Held, End of Year (Net Acres in U.S. Except As Indicated)		
	Total Barrels	Barrels Daily	As Percent of U.S.	Oil	Gas	Total	Producing (Developed or Operated)	Non-Producing (Undeveloped or Prospective)	Total Acreage
All Companies and Persons	**2,244,529,000**	**6,149,394**	**100.00**	**479,095**	.....	.....	.....	.....	.....
(1-A) Standard (N.J.) U.S. Affiliates, Total	148,555,000	407,000	6.62	.....	.....	.....	.....	.....	.....
1. Humble Oil & Refining Co.	127,088,335	348,187	5.66	.....	.....	[15]10,866	.....	.....	.....
(1-B) Standard (N.J.) Net Share of U.S. Affiliates	112,970,361	309,508	5.03						
(a) 72% of Humble	91,503,601	250,695	4.07	.....	.....	.....	.....	.....	.....
(b) 100% of Carter Oil Co.	21,466,665	58,813	0.96	.....	.....	.....	.....	.....	.....
2. The Texas Co.	[1]107,593,195	294,776	4.79	.....	.....	.....	.....	[16]11,448,242	[7]11,448,242
3. Standard Oil Co. of Calif.	[2][9]99,828,230	273,502	4.45	.....	.....	[6]6,907	.....	.....	.....
4. Standard Oil Co. (Ind.)	88,330,000	242,000	3.94	9,043	1,106	[15]10,149	963,400	14,030,000	14,993,400
5. Shell Oil Co.	86,221,000	236,222	3.84	.....	.....	.....	.....	.....	.....
6. Gulf Oil Corp.	85,093,545	233,133	3.79	.....	.....	.....	.....	[7]12,509,000	[17]12,509,000
7. Socony-Vacuum Oil Co.	76,106,000	208,510	3.39	.....	.....	.....	.....	10,500,000	[17]10,500,000
Magnolia Petroleum Co.	59,589,750	163,260	2.65	.....	.....	.....	.....	.....	.....
General Petroleum Corp.	16,516,250	45,250	0.74	.....	.....	.....	.....	.....	.....
8. Phillips Petroleum Co.	41,905,390	114,809	1.87	.....	.....	[8]11,687	[13]893,233	[13]8,331,684	[13]9,224,917
9. Continental Oil Co.	41,811,115	114,551	1.86	.....	.....	.....	278,694	7,090,264	7,368,958
10. Sun Oil Co.	38,202,509	104,664	1.70	.....	.....	.....	.....	.....	[9]9,000,000
11. Sinclair Oil Corp.	37,518,289	102,790	1.67	.....	.....	.....	286,333	9,757,534	10,043,867
12. Tide Water Associated Oil Co.	35,000,215	95,891	1.56	5,462	104	5,566	158,971	1,469,324	1,628,295
13. Ohio Oil Co.	33,804,883	92,616	1.51	[10]7,180	[10]159	[10]7,339	261,982	2,554,979	2,816,961
14. Cities Service Co.	[2, 5]32,839,000	89,970	1.46	.....	.....	.....	.....	.....	10,309,000
15 Union Oil Co. of Calif.	32,007,000	87,690	1.43	.....	.....	.....	.....	.....	.....
16. Atlantic Refining Co.	[3]31,780,000	87,068	1.42	3,218	39	3,257	.....	.....	3,840,000
17. Pure Oil Co.	26,897,785	73,693	1.20	.....	.....	.....	.....	.....	.....
18. Sunray Oil Corp.	[2]26,632,469	72,966	1.19	.....	.....	3,330	164,866	1,639,188	1,804,054
19. Amerada Petroleum Corp.	23,271,654	63,758	1.04	2,065	156	2,221	.....	.....	[14]5,627,000
20. Skelly Oil Co.	23,267,153	63,746	1.04	3,203	385	3,588	315,355	3,649,717	3,965,072
21. Carter Oil Co.	21,466,665	58,813	0.96	.....	.....	.....	.....	.....	.....
22. Richfield Oil Corp.	21,401,000	58,633	0.95	7	1,079	1,086	12,210	159,756	171,966
23. Standard Oil Co. (Ohio)	11,693,819	[4]32,038	0.52	.....	.....	2,739	102,376	1,046,361	1,148,737
24. Plymouth Oil Co.	7,088,386	19,420	0.31	.....	.....	897	.....	467,747	[17]467,747
25. Lion Oil Co.	7,013,577	19,215	0.31	.....	.....	795	31,189	1,386,397	1,417,586
26. Mid-Continent Petroleum Corp.	6,978,906	19,120	0.31	[9]2,023	[9]86	[9]2,109	[9]86,671	[9]1,379,823	[9]1,466,494
27. Texas Pacific Coal & Oil Co.	6,844,618	18,752	0.30	.....	.....	.....	99,478	840,593	940,071
28. United Gas Corp.	6,241,040	17,099	0.28	[12]451	[12]667	[12]1,118	.....	.....	[11]2,022,967
29. Houston Oil Co. of Tex.	[5]5,093,801	13,956	0.22	.....	.....	.....	.....	.....	.....
30. South Penn Oil Co.	[4]4,174,870	11,438	0.19	12,056	427	12,483	371,451	297,135	668,586
31. Deep Rock Oil Corp.	2,972,000	8,142	0.13	.....	.....	[18]458	31,641	664,751	696,392
Total, 31 Companies	1,196,166,449	3,277,168	53.29	.....	.....	[19]86,595	[20]405,758	[21]89,222,495	[22]124,079,312
Royalty and Co-Owner Oil Produced, Est.	170,880,921	468,167	7.62	.....	.....	.....	.....	.....	.....
Gross Production, Above Companies, Est.	1,367,047,370	3,745,335	60.91	.....	.....	.....	.....	.....	.....
Remainder of Industry	877,481,630	2,404,059	39.09	.....	.....	.....	.....	.....	.....
Total, United States	2,244,529,000	6,149,394	100.00	479,095	.....	.....	.....	.....	.....

[1] Includes condensate. [2] Includes royalties received. [3] Includes LPG. [4] Includes other liquid hydrocarbons. [5] Estimate based on gross of 44,003,000 bbls. in 1951 and ratio in 1950 of net being 74.63 percent of gross. [6] Includes few in Canada, Colombia, Venezuela. [7] Not indicated if net or gross. (For Sun Oil, data include acreage in Canada). [8] Gross wells; includes few in Canada and Venezuela. [9] Royalty or working interest. [10] Wells operated. In addition, Ohio had interest in other wells operated by others as follows: 5,086 oil, 36 gas, 5,122 total. [11] Owned in fee, leased, or covered by gas purchased contracts. [12] Wholly owned wells. In addition, United Gas partially owned other wells as follows: 174 oil, 428 gas, 602 total. [13] Gross acreage in U. S. [14] Full or part interest in leases, mineral rights, royalties. [15] Wells operated by company [16] Includes productive acreage. [17] Undeveloped acreage only and not indicated if net or gross. [18] Full interest wells; in addition, Deep Rock had part interest in 1234 wells. [19] Total for 18 companies and subject to footnotes in this column. [20] Total for 15 companies and subject to footnotes in this column. [21] Total for 19 companies and subject to footnotes in this column. [22] Total for 24 companies and subject to footnotes in this column.



Here's the proposed method of storing natural gas in a porous and permeable stratum one-third of a mile below ground at Herscher Dome, 50 miles south of downtown Chicago.

Storage Project to Save Steel

Big Gas Field Near Chicago Will Ease Consumer Demand and Cost Less Than New Pipe Lines

By ANTHONY GIBBON
WORLD OIL Staff

AN UNUSUAL storage project that will increase the natural gas supply of the Chicago area at tremendous savings in steel and money is being planned by The Peoples Gas Light and Coke Company of Chicago.

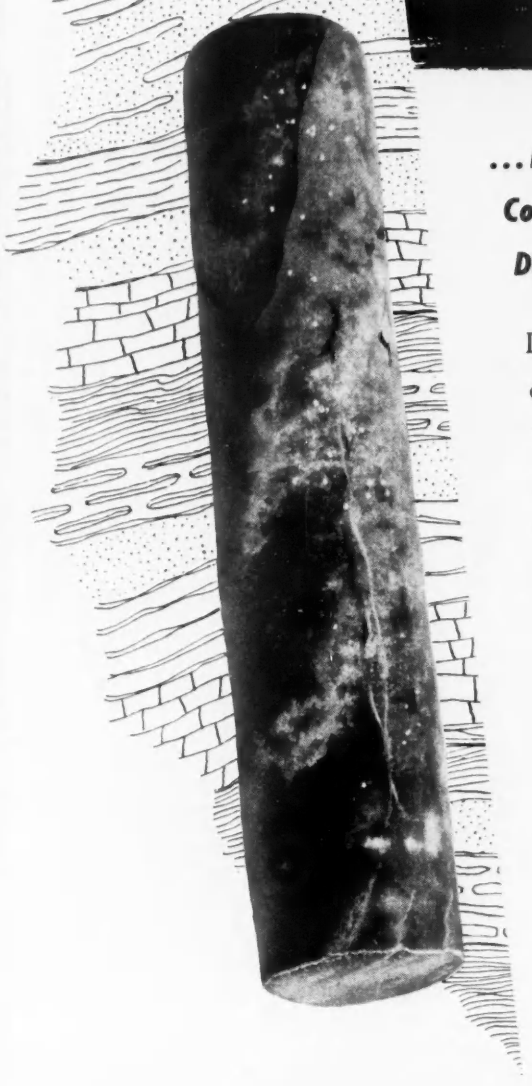
The gas storage field will be located at Herscher Dome in western Kenkakee and northern Iroquois counties, Illinois, 50 miles south of downtown Chicago.

The project will cost between $40 million and $50 million. But the cost is relatively low considering the fact that it will go as far toward meeting consumer demand for gas as three new long-distance pipe lines. Each pipe line would cost $135 million to build.

And if these new lines were built, they and the three present lines serving the area would operate at maximum capacity only a few days out of the year. The rest of the year they would be operating at a fraction of capacity, or the excess capacity would be filled with gas to be sold at low prices in uses for which other fuels would serve.

The Herscher Dome project, which will be one of the largest natural gas underground storage projects in the country, is planned to meet demands along routes served by The Natural Gas Pipeline Company of America and the recently completed Texas Illinois Pipeline Company system, which supplies Texas Gulf Coast natural gas to the Chicago region. The underground storage will have a capacity of 90 million cubic feet of gas, which will be injected into a well-defined dome currently carrying salt water in the formation which is

NOT JUST A MUDCAKE SAMPLE



...But A Natural, Un-compressed, Un-contaminated Core of Formation—Hard Dense Lime—Cut From A Specified Depth With An A-1 Rotary-Type Side Wall Core Barrel

If you want, and expect to get a complete and proper core analysis, you must have a natural core of the formation to start with. Such cores can be taken only by cutting out the formation as you drill, or by taking it from the side wall of open hole with a core cutting tool. Cores of formation in its natural state in the ground, can be taken *uncompressed by explosive forces, uncontaminated by wall mudcake,* and (by testimony of core analysis laboratories) *in more than sufficient amount for every analytical test* with the A-1 Rotary-Type Side Wall Core Barrel.

A-1 engineers, knowing that mud is often caked greater than one inch thick on the side wall, have designed a tool which reaches deep into the formation. In past operation the A-1 Rotary-Type Side Wall Core Barrel has taken cores which average 5.8" in length with a diameter of 1¼".

A-1 BIT & TOOL COMPANY

2000 HUSSION STREET • BOX 2133 • CHarter 7611 • HOUSTON

DISTRICT OFFICES AND SERVICE POINTS:

TEXAS
Beaumont
Corpus Christi
Kilgore
Midland
Victoria

CALIFORNIA
Los Angeles
Baash-Ross Tool Co.

LOUISIANA
Houma
Lafayette
Lake Charles
New Orleans

MISSISSIPPI
Brookhaven

OKLAHOMA
Duncan
Oklahoma City

WYOMING
Casper
W. A. Posey
(Sure-Shot)
Baash-Ross Tool Co.
(Sidewall Cores, Milling, Side-Tracking, and Burris Key Seat Wiper)

ILLINOIS
Olney
Baash-Ross Tool Co.

CANADA
Calgary and Edmondton
Import Tool Co.

EXPORT REPRESENTATIVES:

SOUTH AMERICA:
C. R. Summers,
Avila Hotel,
Caracas,
Venezuela

NEW YORK, N. Y.
Beckley, Haltom & Hickman
30 Rockefeller Plaza

ARGENTINA:
Langley y Cia,
Corrientes 1115
Buenos Aires

NEAR & FAR EAST
W. O. Calvert
20 Copthall Ave.
London E. C. 2
England

MEXICO
J. E. Douglas
2nd Natl. Bank Bldg.
Houston, Texas

MAIL COUPON NOW

A-1 BIT & TOOL CO., P. O. BOX 2133, HOUSTON, TEXAS

Gentlemen: Please send me your latest operation data on the A-1 Side Wall Core Barrel.

Name_____

Address_____

City_____ State_____

to receive the gas. The project will be operated by the Natural Gas Storage Company of Illinois.

Since gas is commonly stored in depleted fields in sands that originally contained gas, the contemplated Herscher Dome technique of storing the gas in a sand that originally contained only water is relatively new although successfully used before.

When in full operation, the Herscher storage field will be capable of delivering a peak-day maximum of 1.5 billion cubic feet of gas from storage for distribution to customer-utility companies supplied by the two pipe line systems, which jointly operate some 4000 miles of lines. This storage gas, together with the delivery capacity of the lines, will make available to consumers on peak days about 2½ times the gas that the pipe lines could deliver without drawing from underground storage.

200,000 Waiting

It is believed that sufficient gas can be stored in the Herscher reservoir to eventually supply the approximately 200,000 single-family dwellings which are on the waiting list of the customer-utility companies supplied by the natural gas pipe lines and to meet future demands for space heating. In Chicago, approximately 65,000 applicants residing in single family dwellings are still to be served with space heating gas. Other thousands of applicants who can be supplied when the Herscher field is in operation reside in some 300 cities, towns and villages in Indiana, Illinois, Wisconsin, Iowa, Kansas and Nebraska.

Considerable work was done to prove that the Herscher Dome is suitable for establishing a safe, practical and economical storage reservoir of large capacity. The existence, size and shape of the dome was determined through more than 100 cored holes to a shallow marker bed known to lie roughly parallel to the reservoir bed in which the gas will be stored, The Dome was confirmed by considerable geophysical work, including more than 100 seismic refractions obtained from the top of the marker bed. Three tests were drilled to slightly more than 2000 feet and furnished accurate data of reservoir conditions and hydrostatic pressures prevailing in the various strata.

The reservoir bed is a highly porous and permeable stratum of Galesville sandstone 100 feet thick and within the "domed" areas covers approximately 15,000 acres. The town of Herscher lies just off the top of the anticline. The top of the reservoir bed is approximately 1750 feet below the surface at the crest of the dome.

This man-made underground reservoir differs little from other well known producing oil and gas fields. However, Herscher Dome carries salt water instead of hydrocarbons. When gas for storage purposes is injected into the reservoir it will compress the water, pushing it back and thus forming a seal to keep the gas within the reservoir zone in much the same way that salt water forms a lateral seal in most oil and gas fields. The salt water in the Galesville sandstone has a hydrostatic pressure of about 700 pounds per square inch.

Surface installations at the storage field will cover approximately 60 acres. Besides interconnecting pipe lines to be placed below ground, about 25 wells will be required for the first year of operation, and perhaps between 35 and 50 wells will be in operation when the storage field is in full use.

Other surface equipment will include a compressor station, power generating station and dehydration plant to remove moisture from the gas as it is withdrawn from storage. Natural gas will be injected into the underground storage reservoir under a pressure of approximately 1000 psi and as it enters the sandstone it will gradually compress and displace the salt water to form a large "bubble" of gas in the reservoir bed in the higher part of the dome.

Gas to be taken from storage will be withdrawn through the same wells used for injection and will be dehydrated before it is put into the pipe line.

Close to Market

For the most economical operation, a gas storage field should be close to the market to be supplied and from this standpoint the Herscher project is ideally situated. It lies just 50 miles south of Chicago's loop and is just 44 miles from the terminals of the three long distance natural gas pipe lines and four miles west of Joliet, Ill.

Seventeen miles of pipe line will be built from the Texas Illinois system's long distance line eastward to the Herscher storage facility to feed gas into the storage field. One, or perhaps two, lines 44 miles long will be built from Herscher northward to the long distance lines' terminals at Joliet to carry the gas from storage to the customer-utility companies supplied by the pipe lines.

The increase in demand for natural gas has forced the pipe lines to enlarge their transmission facilities. Yet the demand for residential space heating service still remains far ahead of the capacity of the pipe lines.

The capacity of Natural Gas Pipeline Company of America's system has been more than doubled since 1941. Today that system's two long distance lines from the Texas Panhandle and Hugoton fields to the Chicago area have a combined daily capacity of 510 million cubic feet.

The region's natural gas supply was increased last December when the new 30-inch pipe line of Texas Illinois Natural Gas Pipeline Company, supplied from Gulf Coast fields of Texas, was completed and placed in service. The new pipe line, costing $135 million, has an initial daily transmission capacity of 374 million cubic feet.

When the Herscher underground storage project is in operation, 26 companies in six Midwestern states, serving a combined population area of approximately 6½ million, will have more natural gas available in the space heating season.

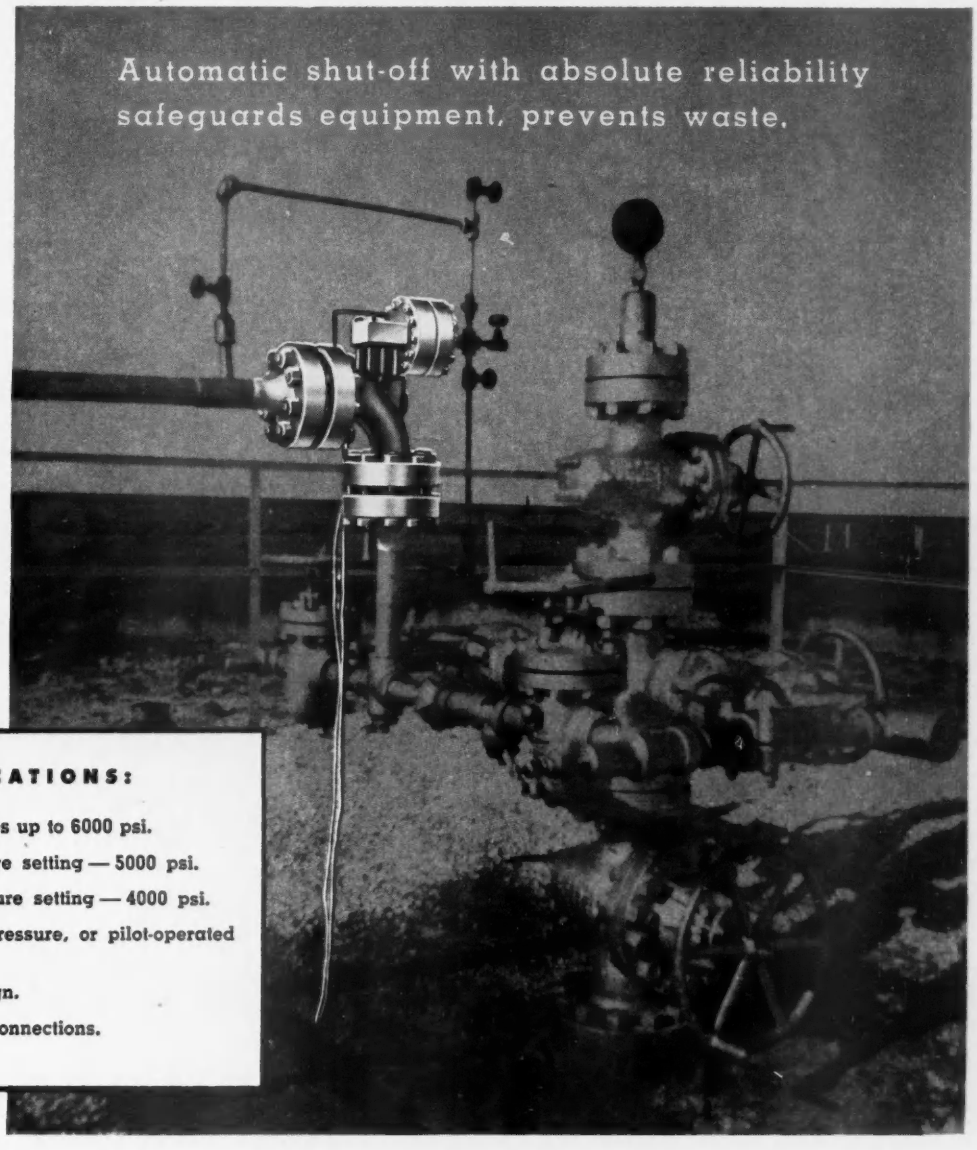
100 Fields Operating

Underground storage of natural gas to meet the seasonally fluctuating nature of the market demands for natural gas have proved successful and today some 100 terminal underground gas storage fields are operating in the U. S. Most of the storage fields in operation utilize depleted gas fields located within reasonable distance from the pipe line supply and the markets served, and the gas is injected into sands which originally carried gas. However, the storage of gas in beds formerly filled with water has proved equally successful. In at least three cases, gas has been injected into and stored in water-filled reservoir beds that had not previously contained gas. One of these is the East Hastings field in Texas.[1] Stanolind Oil & Gas Company injected into this field about 11 billion cubic feet of gas that it would have had to flare or sell at inadequate prices. The others are in the Doe Run and Muldraugh fields of Kentucky, where Louisville Gas and Electric Company has been storing gas in reservoir beds formerly filled with salt water and withdrawing gas to meet peak winter demands.

REFERENCE

[1] "Gas Storage in Water Sand Reservoir at Hastings," WORLD OIL, Oct., 1948; p. 162.

For WELL HEAD PROTECTION use GROVE MODEL 390



SPECIFICATIONS:

- Controls well pressures up to 6000 psi.
- Maximum overpressure setting — 5000 psi.
- Maximum underpressure setting — 4000 psi.
- Overpressure, underpressure, or pilot-operated combination units.
- Angle or in-line design.
- Screwed or flanged connections.

If well flow lines should fracture or freeze . . . if other equipment should fail—will you be ready? For any well head emergency, Grove Model 390 Protection Systems automatically stop the flow—dead tight! They operate as often as required—many times a day, or once in a lifetime. Overpressure or underpressure settings are easily made or changed in the field. Resetting can be manual or automatic.

Model 390 main and pilot valves utilize the patented Grove Dome-loaded Diaphragm-operated principle. Pressure range is universal. Loading is quick and accurate. Elimination of springs, pistons and stuffing boxes assures a tight seal with no chance of corrosion or sticking.

Grove automatic Well Head Protection Systems offer the safest, surest emergency shut-off control available. Wire or write today for detailed technical information.

GROVE

The reliability of Grove Valves and Regulators is proved by the thousands of successful installations handling air, gas, oil, water and other fluids. For the solution to your control problems, contact the nearest Grove representative.

MODEL 390 WELL HEAD PROTECTION SYSTEMS

GROVE REGULATOR CO. 65th and HOLLIS STREETS, EMERYVILLE, CALIFORNIA
1901 CALUMET, HOUSTON 4, TEX. • 415 LEXINGTON AVE., NEW YORK 17, N. Y.
DISTRICT OFFICES: Dallas, Corpus Christi, Odessa, Texas — Lafayette, Louisiana — Tulsa, Oklahoma — Los Angeles, California

—Photo courtesy U. S. Bureau of Mines

The Naval oil shale reserves 1 and 3 near Rifle, Colo. The entrance to U. S. Bureau of Mines experimental mine is shown by arrow at top of zig-zag road.

Naval Reserves Important

What's Being Done to Make Best Use of Petroleum Reserves Which Are So Vital to National Defense

By CAPT. R. H. MEADE, USN
Director, Naval Petroleum Reserves

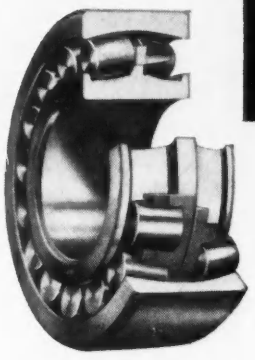
ALTHOUGH few people realize it, the U.S. Navy, through its administration of the naval petroleum and oil shale reserves, is very much in the oil business. Therefore, it is quite proper to ask what is the Navy doing to make the best use of these resources?

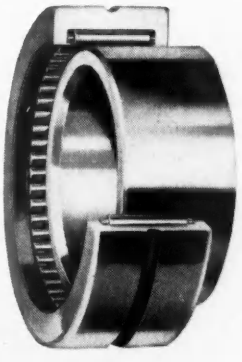
In the first place, it must be recognized that even though the petroleum industry has grown to its present size, and even though it is still growing and making every effort to build up reserves, no less an authority than the Petroleum Administration for Defense has stated that supplies of petroleum would not be adequate in the event of a major war. And it has further stated, that the only shut-in capacity at the present time on the whole West Coast is the naval petroleum reserve at Elk Hills, Calif.

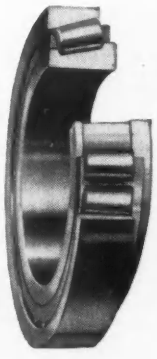
There has been no hint of any plans to establish additional naval petroleum or oil shale reserves. Nevertheless, the feeling exists within the Navy Department that it has the duty to retain, for military reserve purposes, the tremendous assets which are represented by the existing naval petroleum and oil shale reserves, and to place them in such state of readiness as may be appropriate.

In the early 1900's, the public lands of the U.S. throughout the West were fast being transferred to private ownership through agricultural and mineral filings. In that period, the Navy

pulling together...







Working closely with makers and users of all kinds of equipment—from small appliances to giant rolling mills—Torrington engineers have helped solve countless problems involving bearing design, installation and maintenance. They have had many years of experience in the manufacture and application of *all* types of anti-friction bearings.

Have you a friction problem? Would you like to know more about a certain type of bearing in terms of your product? Then call in a Torrington engineer. He will be glad to work with you.

THE TORRINGTON COMPANY

South Bend 21, Ind. Torrington, Conn.

District Offices and Distributors in Principal Cities of United States and Canada

TORRINGTON BEARINGS

Spherical Roller • Tapered Roller • Straight Roller • Needle • Ball • Needle Rollers

A typical well site in the Arctic. Exploration in Naval Petroleum Reserve 4 in Alaska. The enclosed rig permits drilling in sub-zero weather.

was giving consideration to the use of oil-burning power plants for its ships in lieu of coal which was then commonly in use. A great deal of concern was felt that the Navy might find itself with a fleet powered by oil-burning units but without an adequate supply of oil for its ships in time of great emergency. Little was known about the amount of oil available in the United States, and certainly the capacity of the nation to produce oil was then greatly underestimated. However, based upon the best information then available, the decision was made to set aside portions of the public land as naval petroleum and oil shale reserves to assure an adequate supply of petroleum products or synthetics for the Navy's purposes. It is interesting now to note that in 1912 the intent was to secure a reserve for the Navy of oil-bearing public lands in California to assure a supply of 500 million barrels; and it was assumed, at that time, that such a supply would be adequate to provide power during time of peace for all of the ships of the Navy for a period of about twenty-five years. Following this philosophy, between the years 1912 and 1924 there were set aside several naval petroleum and oil shale reserves which will be later described.

Since then, very great changes have occurred. Tremendous advances have been made in the art of exploration and recovery of petroleum products, and the petroleum industry has become one of the largest in the country. It has vastly increased its capacity to produce petroleum fuels and today, under encouragement from the Petroleum Administration for Defense, it is making great efforts to build up a substantial reserve capacity. At the same time, demands of the military have far outgrown the requirements assumed when the naval petroleum reserves were set aside. These demands have not been lessened by the world-wide responsibilities assumed by the United States nor by the advent of air warfare in its various phases, all of which call for enormously increased consumption of petroleum products.

Scandalous 20's

Because of space limitations, this article passes quickly by the period during the middle 1920's and the tumultuous and scandalous events which form the history of the Naval Petroleum Reserves during those years. These spectacular occurrences are still vividly remembered; but it is possibly of greater importance to recall that lessons were learned from these experiences and that strong administrative safeguards have been in effect for the past twenty-five years which are designed to protect national interests in these Reserves. A very close relationship has been built up through the years between the Armed Services Committees of the Congress; and this relationship, supported by the terms of the laws concerning the administration of the reserves, has assured continuous consultation between the Navy department and the Congress and full public review of any important action affecting the status of the reserves.

It will be noted that the detailed plans for each of the reserves, as fully described in the following paragraphs, differ in important respects although they follow a general over-all pattern.

RESERVE NO. 1 is at Elk Hills, Calif. It consists of an area of approximately 46,000 acres containing recoverable reserves estimated at approximately 653 million barrels as of June 30, 1951. Standard Oil Company of California owns approximately 25 to 30 percent of the oil and gas in the several zones; and the Navy and Standard, pursuant to special legislation, are partners in a unit operation with Standard as the operator. The Navy retains control over the quantity and rate of production, and cost and output are shared between the partners in accordance with a detailed contract. At the present time, production is limited to that necessary for testing of wells, for the protection of the field against water encroachment, also a small amount offsetting against drainage to the south in the Buena Vista Field. Development of the field has been going on for several years; and subject to prior authorization by the Congress, the field could, on short notice, be built up to a production of 100,000 barrels a day which amount could be

ROCKWELL ORIFICE METERS

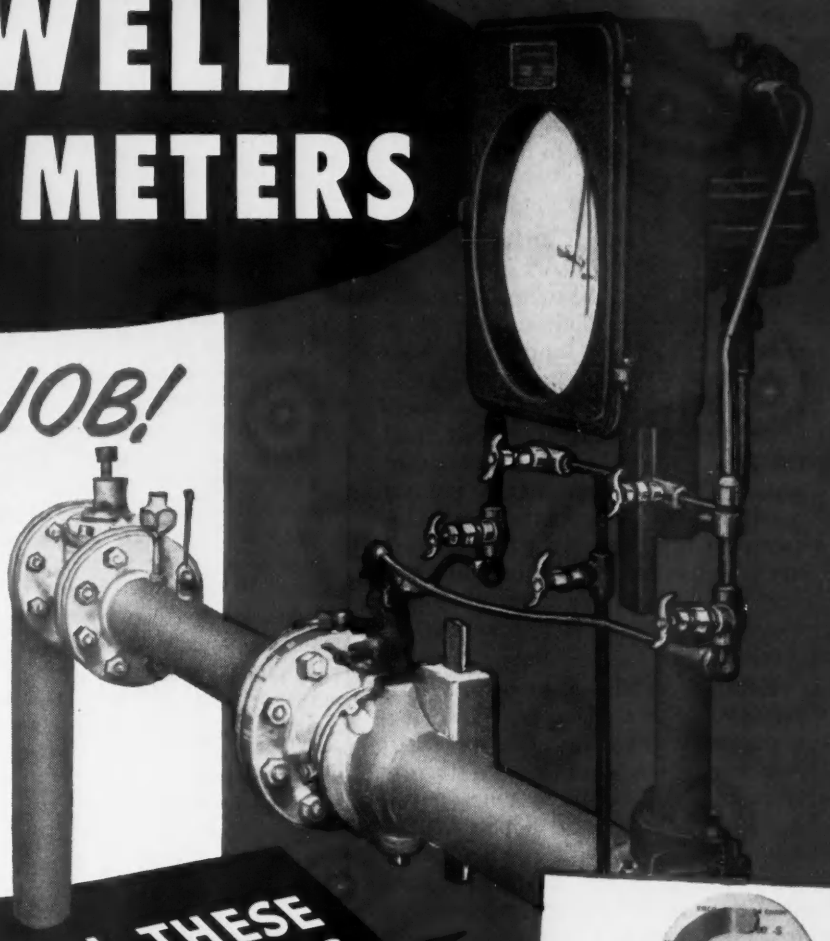
RIGHT ON THE JOB!

with IMPROVED MATERIALS, HEAVIER PARTS, GREATER ACCESSIBILITY

Right on the job . . . and right for the job, too. A favorite with the operating man who appreciates the clean-cut arrangement of internal units, the heavier parts of improved materials that permit Rockwell meters to stay on stream for long periods with minimum attention.

Management, too, has learned that Rockwell mechanical advantages pay dividends in the form of greater accuracy and longer life.

For orifice meter measurement at the lowest cost per cubic foot measured—specify Rockwell! Write for bulletin 1050.



ALL THESE FEATURES

ROCKWELL MANUFACTURING COMPANY

PITTSBURGH 8, PA. Atlanta Boston Chicago Columbus Houston Kansas City Los Angeles New York Pittsburgh San Francisco Seattle Tulsa

You Can RELY ON ROCKWELL

For Everything in Measurement and Control

THE ROCKWELL INTEGRATOR

Mechanically Computes Orifice Meter Charts

Want to improve orifice meter accuracy, cut chart computation costs? Then investigate the Rockwell integrator. It also assures that the accurate recording made by the gauge will be converted into accurate totals with verified records of results. One machine will handle up to 300 average charts a day. Write for bulletin 1016.

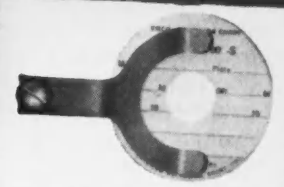
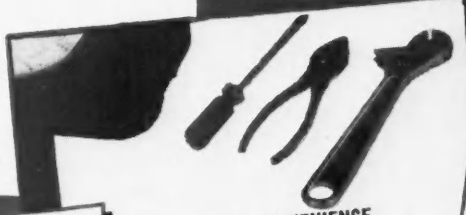


CHART RANGE TAG

Tells at a glance the static and differential range of the meter.

LEAKPROOF STUFFING BOX

Has combination packing and bearing made of Teflon. All other parts of stainless steel. This unit is self-lubricated.



SERVICE CONVENIENCE

The entire meter can be disassembled and built up using common, everyday tools.

INTERCHANGEABLE HIGHSIDE CHAMBERS

The gauge can be quickly converted to any of four standard ranges—20 in., 50 in., 100 in., or 200 in. by simply exchanging one chamber for another.

STAINLESS PEN ARMS WITH MICROMETER ADJUSTMENT

Corrosion resistant stainless steel pen arms are painted different colors for ready identification. A simple micrometer adjustment is provided for zero setting.

ROCKWELL CHART DRIVE

Hermetically sealed. Standard type runs 8 days with one winding. Chart arbor turns once in 24 hours. Turret converters permit chart rotation rate to be changed at will.

POSITIVE INKING

Chart moves from underside of pen to top. Design prevents blurred or missing records.

sustained or increased over a five-year period. This reserve is therefore an important resource which is ready right now in a vital location where it could serve to make an important contribution to the crude oil supply when gravely needed to meet military requirements.

RESERVE NO. 2 at Buena Vista Hills, Calif., contains an area of approximately 30,000 acres. The Navy's interest here is in the minority in contrast to Elk Hills. Substantially all of the Government lands have been leased in order to protect these areas against drainage by others. Unit operating agreements are in effect, and the Navy is simply in the position of protecting the government's interest in this valuable property. Some increase in capacity might be expected under emergency conditions; but this reserve is not, at this time, actually a Naval petroleum reserve in the intended sense.

RESERVE NO. 3, known as Teapot Dome, near Casper, Wyoming, contains approximately 9300 acres. It has long been shut in. Production from the more shallow zones developed in the 1920's did not prove sufficiently large to justify the continued development of the reserve for military purposes. An exploratory well is in progress at this time, however, to deeper horizons. This well has already made two discoveries in these older formations, and it is proposed to make several more tests. At this time, it appears possible that the whole attitude toward this field may require revision and new planning. (Editor's note: This well, Naval Petroleum Reserves No. 1-G-10, Natrona County, Wyoming, at middle of April, 1952, was reported testing at 5320 feet, having plugged back after drilling granite to 8669 feet.)

RESERVE NO. 4 is in northern Alaska. While the areas of the other Reserves have been expressed in thousands of acres, the area of this Reserve must be expressed in thousands of miles. There is an area of 37,000 square miles within the reserve itself and another area almost as large adjacent to the reserve and north of the Brooks range which is available for exploration by the Navy. For some years, the Navy has been engaged in a program of exploration, attempting to make a reasonable evaluation of this reserve. At this time, it has been proved to be a petroliferous province. One oil field containing recoverable oil estimated to contain 30 to 100 million barrels of oil has been discovered and roughly delineated.

About the Author

CAPT. ROBERT H. MEADE graduated "with distinction" from the U.S. Naval Academy, Annapolis, in 1926 and after a year at sea as a junior officer, pursued a three-year post-graduate course in civil engineering including a year a U.S.N.A. postgraduate school and two years at Rensselaer Polytechnic Institute. He was awarded degrees of Civil Engineering and Master of Civil Engineering in 1929 and 1930, respectively. During the war he attained temporary rank as commodore and in 1946 was given the permanent rank of captain (Civil Engineer Corps). On Dec. 1, 1950, he assumed duty as director, Naval Petroleum Reserves.

There have been discoveries of natural gas in half-a-dozen parts of the Reserve and many prospects remain untested. Subject to the availability of funds, it is proposed to continue the exploration until the intended reasonable evaluation of the potentialities of the Reserve can be completed.

The exploration of this arctic area is a great story in itself. In addition to the information obtained on oil and gas, important contributions have been made which add to the knowledge of world geology and other matters of importance to science and the defense of the nation.

Oil Shale Reserves

As a further assurance of oil for the Navy in future emergencies, it was decided to segregate certain sections of the public domain containing shale rock capable of being mined and the hydrocarbons therein converted into oil. Two large areas have been set aside; one near Rifle, Colo., is designated as Oil Shale Reserves Nos. 1 and 3, but these adjacent properties consist of a single area of approximately 67,000 acres. In Utah, Oil Shale Reserve No. 2 consists of approximately 96,000 acres.

The time when it will be necessary to develop resources on a large scale is a subject now receiving much attention from government and industry. There is presently no agreement on this point, but all do agree that recovery of useful products from the oil shales is technically possible and that the potential recovery is estimated in the hundreds of billions of barrels. No work has been done on these reserves by the Navy; in fact, the Congress has seen fit to require that the Navy, at this time, do no exploration or development with these reserves. Such work as has been done by any government activity, has been in Colorado on the naval oil shale reserves by and under the direction of the Bureau of Mines at its excellent experimental plant near Rifle, Colo. The Navy has observed this operation closely as well as the research and development work of certain private companies, and has adopted a policy of encouraging these efforts wherever it is in a position to do so.

While there is nothing in the records to show that the oil shale reserves were set aside for any purpose other than to reserve the oil shale for military purposes, at the present time the possibility exists of discoveries of oil or gas, particularly in the Utah reserve in the Uintah Basin. Naturally, commercial exploration in this basin is being observed with considerable interest.

Important Assets

While the philosophy underlying the naval Petroleum and oil shale reserves has undergone change through the years, these reserves are an important part of our national assets dedicated to national defense.

It is also interesting to note that from the fiscal year 1916 through fiscal year 1951, the total income from all sources from the naval petroleum reserves received by the U. S. Government was approximately $92 million. During the same period, expenditures have amounted to approximately $75 million. Thus the program pays its own way; and it may be pointed out that after exploring and developing naval Petroleum Reserve No. 1 to its present potential, having proved reserves of approximately 700 million barrels of oil in this field, and having carried the Alaskan exploration program and the administration of the other reserves, the total income figure exceeds all capital and non-capital expenditures made to date by approximately $17 million.

Utah's Oil Outlook Brightens

Evidence Indicates That State May Soon Rival Wyoming as Producer of Petroleum

By DR. E. J. EARDLEY
University of Utah, Salt Lake City

AN attempt today to appraise Utah's future as an oil and gas producing state must be highlighted with optimism. Four years ago, a report would have been shaded with pessimism. But today the state has an established daily production of 3000 barrels of oil, while in 1948 it had none. The state now has four commercial oil fields: the Ashley Valley, producing from the Weber sandstone, and the Roosevelt, Red Wash and Duchesne fields producing from the basal Green River.

Also within its boundaries is the Clay Basin gas field which has been helping supply Salt Lake City since 1937. The Boundary Buttes gas field probably contains a good reserve but remains undeveloped and unused. Recently another combustible gas field seems to have been discovered with the drilling in of the Clear Creek well in Carbon County, estimated to have a daily potential of 8 million cubic feet.

This significant record of discovery in the last four years could be projected into the future and a rosy picture imagined. But there are a number of geologic factors that must be appraised before one can conclude on a rational basis whether or not future discoveries will continue at the rate of the past four years.

Geologic criteria used in attempting to judge the possible and probable reserves of a comparatively little explored region are listed as follows by Levorsen:

- Volume of sedimentary rocks.
- Evidences of oil and gas at the surface.
- Unconformities.
- Wedge belts of porosity.

As far as Utah is concerned let us consider the first criterion, volume of sedimentary rock. The idea here is that oil and gas occur in sedimentary rocks only, and that the more of such rock the better. Utah may be divided conveniently into three great provinces, the Great Basin, the Colorado Plateau and the central mountain belt which includes the High Plateaus from St. George to Nephi, the Wasatch Mountains from Nephi northward to Idaho and the Uinta Mountains. All three provinces are underlain chiefly by sedimentary rock. It is estimated that not more than 15 percent of the state is underlain by non-sedimentary rock, and therefore, that 85 percent of the state has a possibility of producing oil and gas, if only this one criterion is the basis for judging. But other criteria need to be considered before becoming too optimistic.

Nothing is more meaningful in the exploration of oil and gas than direct signs at the surface of these materials. We have in mind oil and gas seeps, asphalt or bituminous sandstone, oil shales and hydrocarbon dikes. Every major oil province in the world has its surface indications, and it was these signs that first led to exploration. The oil of the Bridge Lands has been known since Biblical times. Pennsylvanian oil was gathered from seeps by the early colonizers, and the Rancho LaBrea tar pits of southern California trapped many animals of prey of the past ice age. Venezuelan oil has leaked out at the surface in large amounts.

Solid Hydrocarbon Dikes

In Utah a number of oil seeps have been known for over 50 years. There is no place in the world that has solid hydrocarbon dikes of the variety, size and number, as the Uinta Basin of Utah. Although the origin of these dikes is still not clear they are generally considered to have had an association with oil or with material which could have been converted to oil. Their volume is very large and represents millions of barrels of oil. If as much hydrocarbon material in oily form should still remain below the surface it would constitute several major oil fields.

Most everyone realizes that the Uinta and Piceance basins of Utah and Colorado contain one of the world's greatest, if not the greatest, oil shale reserve. Several billion barrels of oil can be made from this reserve. Again, geologists are not yet sure what the relation is of the oil shale, the hydrocarbon dikes, and

liquid oil recently discovered in the same formation, but certainly one of the worthwhile theories considers that the three substances have much in common.

In the course of drilling over the past 30 years in the Colorado Plateau, many shows of oil have been encountered, and these, together with the surface shows, point up Utah as a worthwhile area in which to explore for oil.

Another Method

The third criterion by which to judge an area for its oil and gas possibilities is the presence or absence of unconformities. According to Levorsen:

"Much of our present and past oil production has been found associated with unconformities. They mark the position of overlaps, variable porosity, folding and traps. Unconformities separate the various layers of geology and many mark the place in the geologic section of greatest stratigraphic and structural change. It is at unconformities that geologists and geophysicists most commonly make their mistakes—because it is here that the changes occur which are unpredictable. The presence of a known regional unconformity within an area increases the chances of finding favorable petroleum geology because it overlies and hides a new and unknown set of geologic conditions.

"It may not everywhere double the favorable area of prospecting but it certainly adds to it. Thus, an area with two or three known regional unconformities is two or three times more favorable to ultimate oil discovery than an area with none. Furthermore, if there is evidence in the region of pre-unconformity folding or deformation, the chances of finding oil are definitely more attractive than where there is an absence of such pre-unconformity deformation. Therefore, the unconformities which are known or thought to be present in each of the prospective areas are described as another factor favorable to oil accumulation."

These comments pertain most aptly to a geology like that of Kansas, Oklahoma and Texas. But they are good cause for us to reflect on the unconformities in Utah. In the Great Basin, the Devonian and Pennsylvanian systems are particularly the most significant for overlaps and facies changes; in the Colorado Plateau the Ancestral Rockies are the site of extensive Pennsylvanian and Permian clastic flanking deposits, and then of overlaps and complete burial in Triassic, Jurassic, and Cretaceous time. As more wells are drilled and carefully tied to surface sections other unconformities will be discovered. The late Cretaceous and early Tertiary mountain building of the central mountain belt and the Uinta Mountains has resulted in extensive areas of overlap and unconformity.

Most Rocky Mountain oil to date has come from anticlines, and the finding of oil along unconformities is a more difficult task, but they will undoubtedly serve to focus much attention in the future. Searching for oil along uncomformities is the most promising course in the future.

Porous Wedge Belts

The last criterion mentioned is that of wedge belts of porosity:

"The reservoir rocks in many oil fields are in the form of a wedge belt of porosity. Simple examples are the East Texas field, the Bartlesville sand province, and others of this type. Even where the individual pool is located on a structural trap, a fold, or a fault, the province as a whole may be determined by the presence of a regional wedge of porosity within the reservoir rock. Thus, much of the production in West Texas, in the Midway-Sunset area of California, or in the Cromwell sand of Oklahoma is found in local folds and structures which in turn are in the vicinity of the edge of a regional belt of porosity."

The extent of wedge belts of porosity in Utah is difficult to estimate at present. To distinguish wedge belts of porosity from unconformities is generally impossible on hand of existing information, and what has been said of the existence and distribution of unconformities applies, as far as we know in Utah, also to wedge belts of porosity. In our thick basin sections of sedimentary rocks it seems more probable to me that numerous wedges and pinch-outs exist. It is up to the geologist to find them.

Unfavorable Factors

All that has been said so far may be listed on the favorable side of the ledger. There are some unfavorable elements. First, a good many wells have been drilled for oil and gas in the state over the past 50 years; some 600 of them. Many of them were distinctly promotional and not based on sound geologic information, and therefore to the geologist, do not count. But every strong anticlinal structure, evident at the surface, had an honest test without success before the first field, the Ashley Valley, was brought in. Whereas many anticlines in Wyoming and Colorado proved to be good producers, those in Utah seemed to be failures. The salt anticlines in the Moab area are now known to be complex, so probably some of the wells drilled in and around them are not as meaningful as formerly believed. But it is not a very hopeful venture to drill a new well along side an old one unless deeper, unexplored horizons are in sight of the bit. Deeper drilling is a possibility in some areas, but already the second and deeper round of drilling has taken place. In some structures there is no need to drill deeper because the hole bottomed in pre-Cambrian rock.

The three recently discovered fields in the Uinta Basin have tapped accumulations in structures not evident at the surface. The structures were discovered by the seismograph and are so gentle and have so little closure that the oil may not have accumulated entirely due to anticlinal control. This brings up another point. Production from the base of the Green River formation is still a comparative unknown. Not enough wells have yet been drilled around the discovery wells to demonstrate how large the producing areas will be, and we are also still far from certain what the performance of the wells will be. At least four structures found by seismic surveys, and which appeared as favorable as those that have produced, have been drilled, many expensive tests made, and the wells finally abandoned.

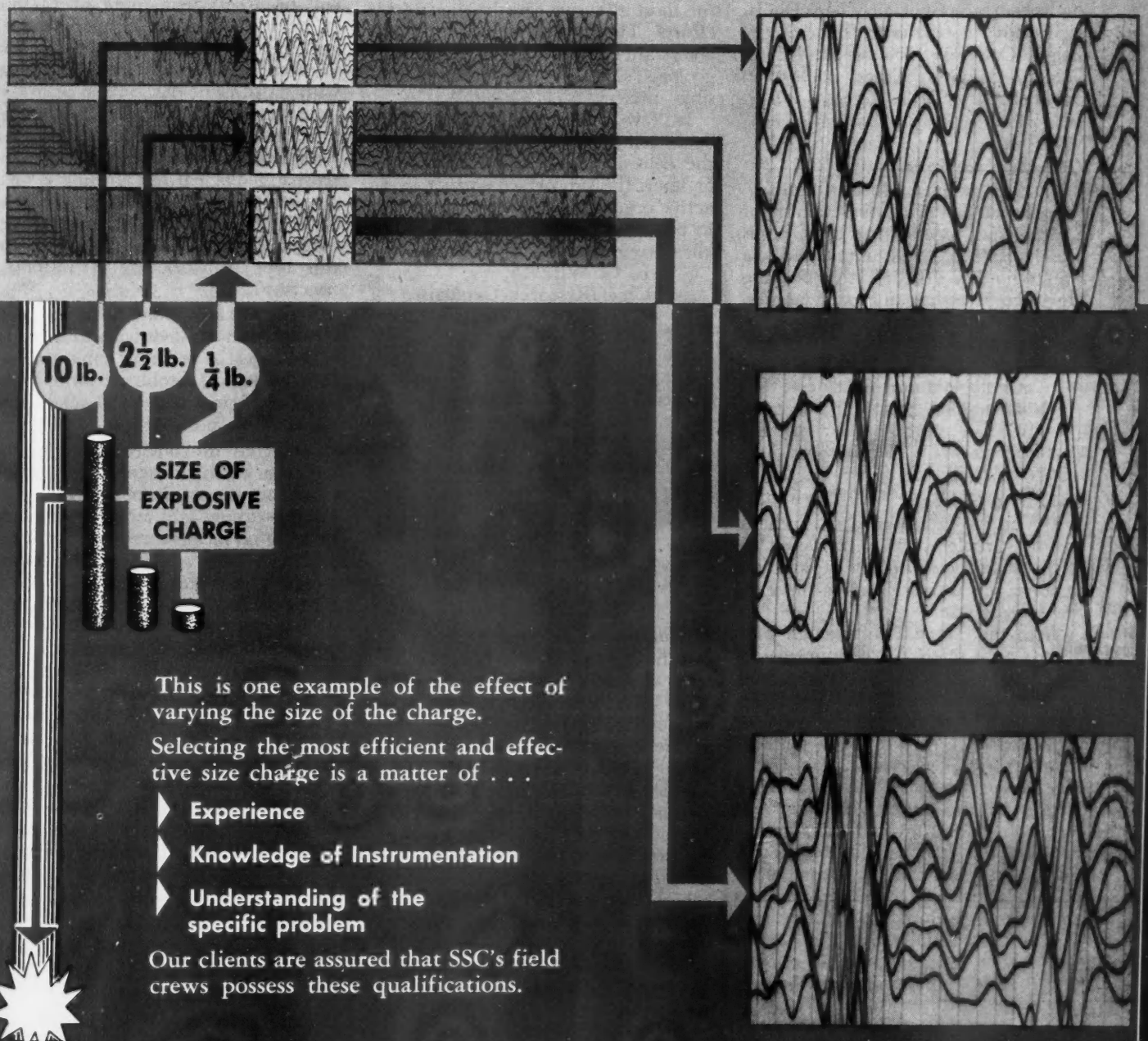
There must be numerous, valuable accumulations of oil and gas in Utah hidden below the surface, but that they are not going to be easy to find. For the most part they will be found by a careful integration of geophysical and geological work, and will be chiefly up-dip structures such as wedge-outs and unconformities. Several more fields like the Roosevelt and Duchesne will be discovered within the Uinta Basin and oil from this one large basin alone will be a great new influence on the economy of the Provo-Salt Lake-Ogden region in particular and of Utah in general. Because of the difficulty in discovery, the rate of discovery will be modest and, therefore, Utah will grow slowly as an important oil and gas producing state. It is already solidly in the picture, and its position will grow to one second only to that of Wyoming in the next decade.

ACKNOWLEDGMENT

This paper was presented by Dr. Eardley as his presidential address at the opening meeting of the Rocky Mountain Section of the American Association of Petroleum Geologists at Salt Lake City in February. Dr. Eardley is past president of the group.

Basic Methods of Improving Seismic Records...

The Effect ...of SIZE of CHARGE



This is one example of the effect of varying the size of the charge.

Selecting the most efficient and effective size charge is a matter of . . .

- **Experience**
- **Knowledge of Instrumentation**
- **Understanding of the specific problem**

Our clients are assured that SSC's field crews possess these qualifications.

Seismograph Service Corporation

Seismic Surveys — Gravity Surveys — Pilot Crews — Lorac

TULSA 1, OKLAHOMA, U.S.A.

READERS AGREE:

Broad Training Essential For Subsurface Geologists

HERE are some comments by exploration executives on "Training Subsurface Geologists," by Dr. L. W. LeRoy, associate professor of geology, Colorado School of Mines, Golden, Colo., published in WORLD OIL, February, 1952, Pages 77-80.

•

Valuable if so Trained

Dr. LeRoy has left out nothing. His summary of what the training of a subsurface geologist should be is broad, extensive and undoubtedly a man who has had all the training suggested, if he has any native ability, would be valuable in any phase of the industry.

—DR. FREDERIC H. LAHEE,
Geological and Research Counselor, Sun Oil Company, Dallas.

•

Good as a Guide

The ideas expressed are excellent and the article is timely. It would be to the advantage of every exploration organization to use the program outlined as a guide.

With the elimination through past discovery of many of the more easily found oil and gas accumulations, and the mounting demands for petroleum products and natural gas, subsurface geologists have grown into a position of great responsibility in the U. S. The industry looks to them very largely for the creative thinking and ideas which lead to discovery. Recognition of this responsibility by WORLD OIL and by Dr. LeRoy is commendable. No activity is more vital to the future health of the industry.

—R. L. KIDD,
Vice President, Cities Service Oil Company, Bartlesville, Okla.

•

Covered Gamut

Dr. LeRoy's paper indicates that he has a keen understanding of the problems and functions of a subsurface geologist and the possible demands upon him, as well as the many phases of the operations that the geologist will have to understand for the most effective coordination of his efforts. The author has covered just about the gamut of the subsurface geologist's field of activity and possible interest.

In few cases would any single operation involve all or even most of the considerations listed. But sooner or later, the subsurface worker in an active organization will have occasion to be concerned profitably with them all.

—L. G. WEEKS,
Chief Research Geologist, Standard Oil Company (New Jersey), New York.

•

Merits Careful Consideration

I am in general agreement with Dr. LeRoy and I hope that his article will receive wide distribution and careful consideration.

—W. F. BARBAT,
Chief Geologist, Standard Oil Company of California, San Francisco.

•

Instructive and Informative

I have read this article, as have several members of my staff, and we have found it to be a very instructive and informative article, particularly where it concerns the training of young geologists recently out of school. It sets out in a very concise manner the various steps a geologist must go through, as well as the things he should look for.

My purpose in writing is to inquire whether it would be possible for us to reproduce this article for our own company use. I should like to make a copy available to each of the young geologists now in our organization and also to beginners as we employ them, in order that they may read it carefully and get a better idea of what is expected of them in the performance of their duties.

—JOSEPH E. MORERO,
Vice President, Exploration Department, Skelly Oil Company, Tulsa.

Subsurface Surveys Needed

I think the article is excellent. Care must be exercised to make sure that subsurface geology does not become too highly specialized and too far removed from the work of surface geology and the broader phases of oil exploration. It is important that subsurface geologists avoid getting into the rut of simply keeping the geological and engineering records of wells. More of their work in the future will be to look ahead, to plan and execute subsurface geological surveys.

It is my opinion that the greatest single tool of the exploration geologist will be access to a more liberal use of the drill for the development of geological information to build up the science of subsurface geology, which, with insufficient data in the past, has been responsible for the finding of many oil fields. I mean by that, a recognition of the need for more extensive geological test drilling by geologists, the geologists' selling of the idea to management, and the geologists having access to as much of this type of work as is considered necessary.

I am talking about holes properly located and drilled with respect to other holes in order to solve subsurface geological problems or to complete geological surveys in relation to oil and gas possibilities.

This has of course been done in the form of shallow core drilling and in an occasional deep slim hole, but the operation as I now view it has been by no means extensive. The new drilling which I have in mind is not properly defined by the old terms "core drilling" or "test well drilling." If we are going deep and if the project is designed principally for geological information, we might better refer to this operation as "geological survey drilling," or just "survey drilling," or "survey holes."

A new technological field is opening, the field of the subsurface exploration geologist. The work of geologists in this group will be to plan and execute subsurface geological surveys, integrated with surface and geophysical surveys, through the drilling of survey holes. They will explore aggressively the subsurface for critical geological information and not merely keep the data which happen to be available as a by-product of conventional test well drilling.

—FRANK A. MORGAN,
Past President of American Association of Petroleum Geologists, Richfield Oil Corporation, Los Angeles.

Thermal Differential Curves Reflect Subsurface Geology

Heating of Well Cuttings Shows Mineral Content and Identifies Strata

By FLORENT H. BAILLY
Pasadena, Calif.

A TOOL now available to the oil geologist has been applied systematically for the first time in the solution of problems of correlation.

The use of thermal differential curves as applied to the interpretation and analysis of clay minerals is known. The use of these curves has been extended to the examination of ditch cuttings sampled at sufficiently close intervals in any one well. The thermal differential curves determine suites or assemblages of minerals and other matter which normally may be present in the samples or cuttings.

Ditch samples are specially prepared in order to obtain dry, oil-free, and definite particle-sized material. The prepared sample is introduced into the holder of the apparatus, which has been developed to a high degree of sensitivity and efficiency, designed after that of Norton.[1] The equipment itself consists of four components: the furnace, its control for constant temperature rise, the sample holder with the necessary thermocouple attachments, and the recording instruments. Single recording and multiple recording instruments form part of the equipment now in use.

If one sample of ditch cuttings is taken every ten feet, it is possible to obtain a series of differential thermal curves at the rate of 1000 feet of drilled section per day.

The differential thermal curves thus obtained represent a record of the heat changes occurring in a substance as the substance itself is heated in the furnace at a constant rate. When heat is applied to hydrous mineral substances, such phenomena as loss of water, oxidation, decomposition, and crystal structure changes are known to occur. These changes or reactions are invariably accompanied by release or employment of energy (heat), and they are recorded on the constant rate heat increase curve for the particular furnace in which the sample is placed as exo- and endothermic effects.

The temperature and intensity of these thermal effects are different and well-known for each type of "pure" mineral, and accordingly provide a basis for identification. In a ditch sample, or sample of any rock, the differential thermal curve is an integration of all the thermal effects, both exo and endo, of an assemblage of minerals. For any formation, differential curves obtained from a series of cuttings taken in sequence will give a family of curves representing the assemblage or suite of minerals present throughout that interval. Any departure in the appearance of curve from the family curve will therefore indicate a change in the assemblage of minerals and result in a marker which may become significant if the same sequence of family curves and change is observed from cuttings taken elsewhere in an area.

Figures 1 and 2 reproduce actual differential thermal curves obtained from ditch cuttings from wells taken at the depths indicated on the curves. The electric logs in the intervals from which these cuttings were taken were absolutely without diagnostic significance and revealed no markers that could be used for correlative purposes. Paleontological data were not only sparse but in some cases absent because the section was barren of foraminifera. This is the case in Figure 1, which represents a depth interval of 70 feet from a single well. The interval beginning at the 8600-foot depth and extending through the 8620-foot depth appears to be characterized by a family of curves of varying ratios of siderite and clay minerals. Siderite may be identified by an endothermic peak at about 550° to 580° C., followed by an exothermic peak occurring at 600° to 700° C. The clues to the clay material are given by a hint of a double endothermic peak at 120° to 160°, an endo occurring at 500° to 550° C., and a slight exo at 850° to 900° C.

A complete absence of siderite appears for the interval 8620-35 feet. Only the clay materials appear to be present, possibly consisting of mixtures of montmorillonite, illite, and kaolinite.

Siderite again appears at the 8635-foot depth as well as a new constituent represented by an endothermic peak occurring at from 800° to 860° C., which persists until the 8650-foot depth is reached. This new constituent appears to be calcite since this mineral decomposes with the liberation of CO_2 at about 825° C. The interval beyond the 8650-foot depth as shown by the curves of the succeeding samples then reverts back to the original family of curves in which siderite and clay materials are present in mixtures of various ratios.

Figure 2 graphically illustrates both

About the Author

FLORENT H. BAILLY is president of the Petroleum Engineering Associates, Inc., Oil Properties Consultants, Inc., and International Petroleum Consultants, Ltd., of Pasadena, Calif. He graduated from the California Institute of Technology in 1927, having specialized in geology and civil engineering. He joined Pantepec Oil Company in 1928, serving as field engineer, geologist and engineer in charge of development and chief geologist and chief engineer. From 1942-48 he held these positions as consultant. In June, 1949, he was elected president of Pantepec Oil Company, C.A., and Pancoastal Oil Company, C.A., of Venezuela, which position he held until January, 1951. Since returning to the U. S. in 1942 he has continued his activities in Venezuela and is at present consulting engineer and geologist for both Pantepec and Pancoastal Oil companies.

gradual and abrupt changes in formation by the differential thermal curves of samples representing this depth interval. It may be observed that a gradual change or shifting of the exothermic siderite peak begins at 5410-foot depth and continues to shift to the right with increasing temperature until the 5445-foot depth is reached. A micropaleo marker was also found to occur at the 5410-foot depth. The succeeding sample then shows an abrupt peak shift to the left approaching closely the curve of the initial sample for this interval.

Similar breaks were observed throughout the entire well. A review of the results from micropaleo examinations showed only six markers for this well, whereas the breaks as indicated by thermal data were more numerous and appeared to show considerable detail. Micropaleo markers were observed to coincide in four cases at the exact depth and within ten feet for the other two markers.

The series of curves, plotted at depth intervals corresponding to the position assigned the cutting or core sample, gives a running log of the formations encountered in a well or surface section samples. Any changes in mineral assemblages, whether mild and transitional or sharp and abrupt in character, will show up very plainly through corresponding changes in the appearance of the differential curves.

The changes in the curve appearance mark zones of even relative thin beds containing distinctive mineral assemblages, or an unusual concentration of any one mineral. Changes within a zone may be transitional and gradual as, through time, a shift in concentration of any one mineral or group of minerals varies. This in itself may mark a zone. A repetition of such a zone may indicate cyclic behavior or actual mechanical repetition of formation of the same age. These are all useful markers which may be used from location to location within a basin of sedimentation deriving its material from a common source.

This method of zoning in a basin dependent upon a common source of sediments will supplement paleontological zoning, confirm it, and even permit a finer differentiation of sediments within thicker sections containing no diagnostic microfaunal variations. The use of this method is of particular importance in sedimentary zones barren of microfauna.

As pointed out above, the use of this method could very well be restricted to basins dependent upon the same source material. However, an examination of the differential curve appearance from well location to well location will also bring out horizontal transition of material if this exists.

In using this method for horizontal correlation, paleontological examinations and determinations should be coordinated and age equivalents would be maintained.

At a given point in geologic time any introduction of new mineral assemblages into the section would indicate a change of source material, thereby making it possible to detect transitional belts from one basin into another. It is conceivable that it should also be possible to determine, through mineral assemblages, any time-equivalent transition from marine to neritic to continental environments within the same basin.

REFERENCE

[1] F. H. Norton, "Critical Study of the Differential Thermal Method for the Identification of the Clay Minerals," Jour. Am. Cer. Soc. 22, 1939, pp. 54-63.

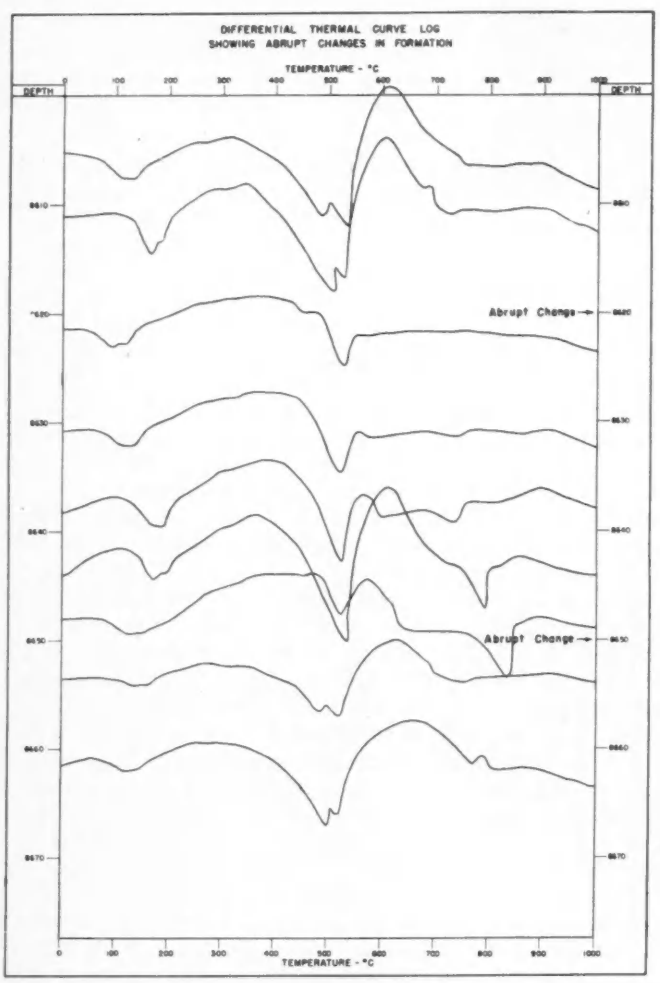


FIGURE 1.

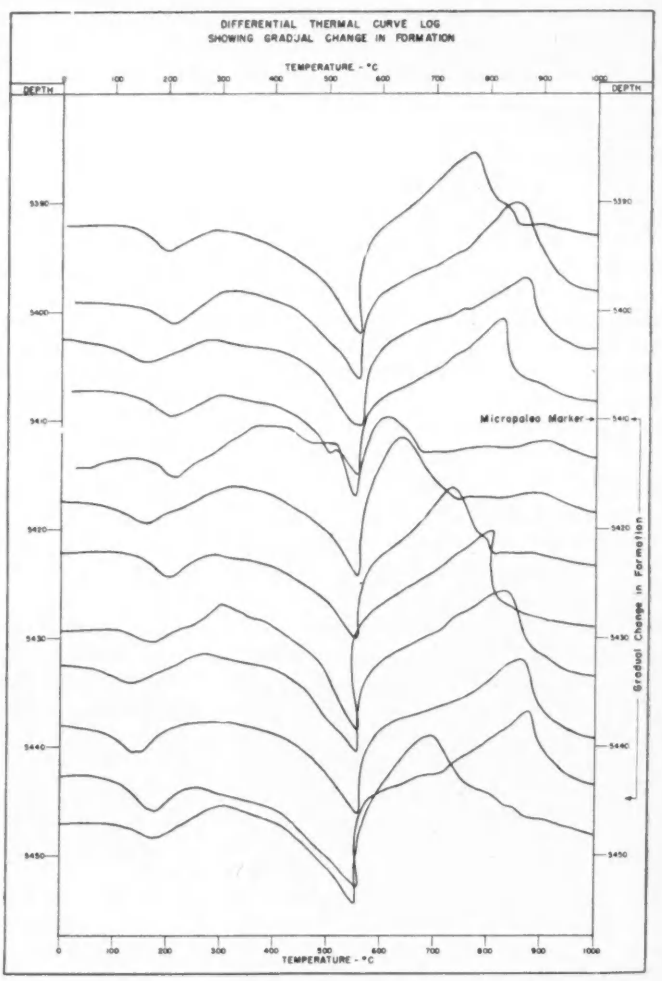
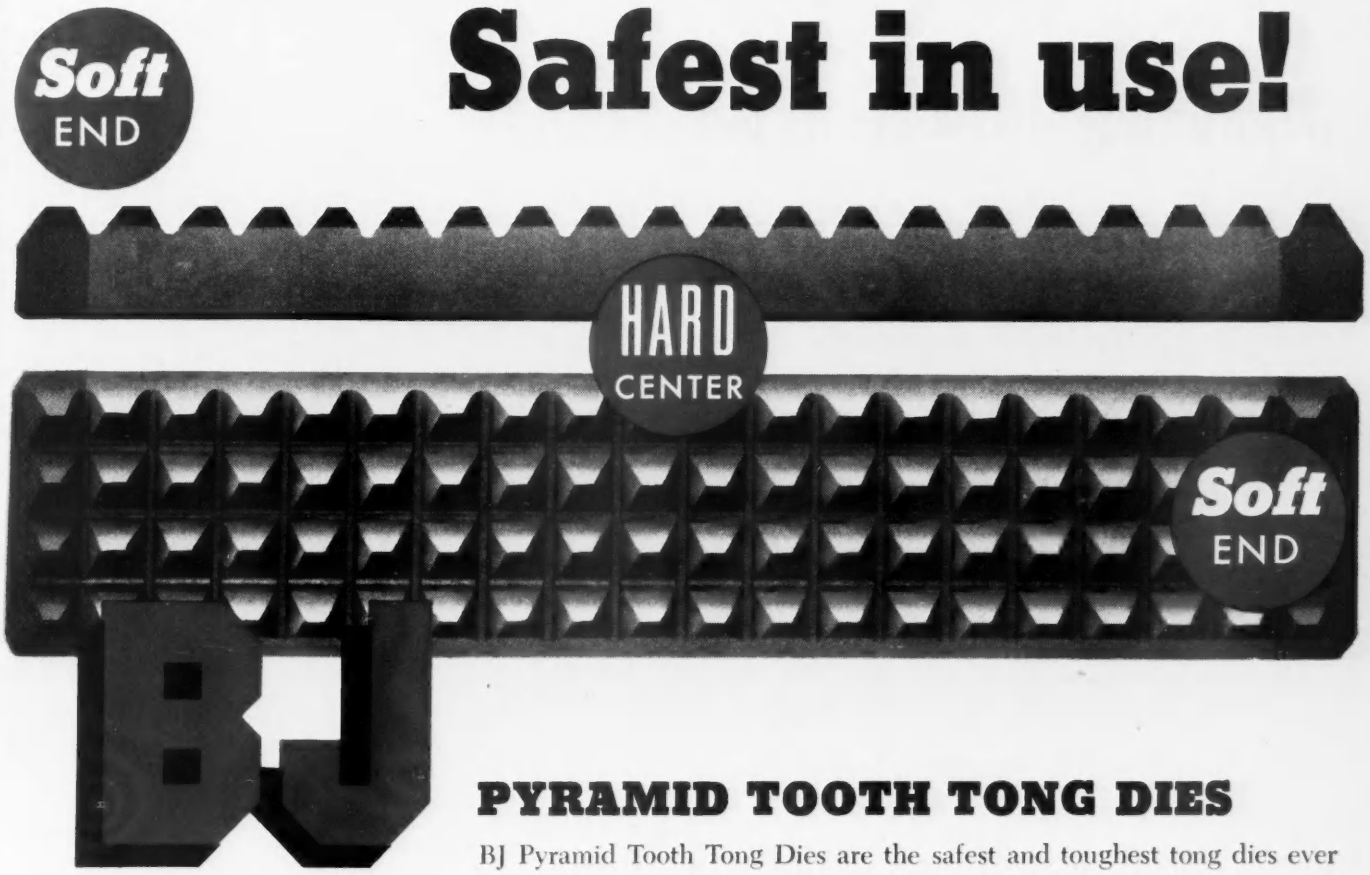


FIGURE 2.

Safest to use!
Safest in use!



PYRAMID TOOTH TONG DIES

BJ Pyramid Tooth Tong Dies are the safest and toughest tong dies ever made—they give you these PLUS advantages...

EXTRA SAFETY — non-chip soft ends are safer, easier to use—

WON'T CHIP — no eye injuries or other accidents on the derrick floor—

TOP ECONOMY — you use fewer dies, make fewer changes—

REVERSIBLE — turned end-for-end, they do twice as much work—at no extra cost—

A POSITIVE GRIP — grips instantly—sharp pointed teeth won't slip—

Made for all rotary and casing tongs—stocked by supply stores in every field. Look for the red box with the big BJ—and for safety and economy, insist on the best—buy BJ!

REMEMBER...

look for the red box with the big "BJ"

Stocked by supply stores in every field...or ask your BJ representative.

BJ MEANS ENGINEERED OIL TOOLS

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER

Byron Jackson Co.

Since 1872

P. O. BOX 2017, TERMINAL ANNEX
LOS ANGELES 54, CALIFORNIA

Offices in Principal Cities

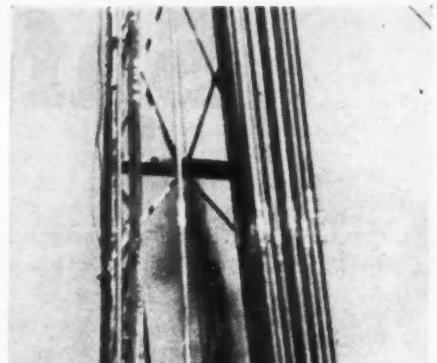
3525A Martin R. Klitten Co. 352

Discovery in Oklahoma Opens Potential Reef Trend Play

Apparent Production on Anadarko Basin Flank Encourages Drilling as Far Away as 35 Miles

By ANTHONY GIBBON

WORLD OIL Staff



Final drill stem test at Flynn Oil Company's School Land 1, key discovery in the Oklahoma Panhandle. Test indicated 50 barrels of high-gravity oil an hour.

A NEW oil discovery in Beaver County, Oklahoma Panhandle, 15 miles from nearest production, gives indication of being the first reef-type production to be encountered in Oklahoma. If this is correct — and geologists who have studied the cuttings from the well report ample indications of reef-forming material throughout a thick lime section—then the discovery opens a trend which may well cover an area of approximately 5000 square miles in northwestern Oklahoma and southeastern Kansas.

First Indication

First indication that a new chapter in Oklahoma oil history was being written was the report, early in December, 1951, that Flynn Oil Company's School Land 1, SE SE SE 35-5n-23 ecm, midway between Forgan and Beaver, county seat of Beaver County, had tested an estimated 50 barrels of high-gravity oil an hour from the Marmaton or basal Kansas City lime of the Pennsylvanian series.

The independent oil company that made the discovery is headed by Olney F. Flynn of Tulsa. Assisting him in the field work were W. W. Martin, Jr., his son-in-law, and E. W. Pribyl, vice president, Barbour Drilling Company, Tulsa.

Flynn became interested in the venture late last year when he contracted to drill a well to the Lower Mississippian in search of production from the Morrow or Chester formations which produce in southwest Kansas. He acquired 1000 acres out of a block of almost 3000 acres assembled by Roy Nash of Amarillo, Texas.

Flynn says there was no good geological basis for drilling the well and he had no expectation of finding oil before reaching the Morrow or Chester group. Some geophysical work and core drilling had been done in the general area but the results were inconclusive. However, $35,000 in dry hole money was offered by Stanolind Oil & Gas Company and Cities Service Oil Company which hold close-in acreage, and this financial support was the deciding factor in the deal. Flynn later waived dry hole money before final completion although the well cost in excess of $75,000.

In discussing the location, Martin declares it was the most rugged he has ever seen. Sand dunes and shifting sands following the Beaver River which runs east and west extend for about two miles on either side of the dry stream bed. Beyond and to the north are rich wheat and pasture lands. Because of the location of the block, however, the stake for the test had to be driven in the forbidding sand dune country.

Road Built

In order to move in it was necessary for the operator to build about a mile of road to the location. Road building and other preparations cost about $10,000, but even with the most modern equipment, the last 300 feet to the location defied the road builders and two bulldozers were used to snake all equipment onto the derrick floor.

Flynn's School Land 1 spudded in Oct. 19, 1951, with Barbour Drilling Company of Tulsa as contractor, using a 7500-foot rig. From the start drilling was easy as the bits penetrated soft, friable, unconsolidated formations.

Ten-inch surface was set at 330 feet and a nine-inch intermediate string

at 2769 feet. The Harrington and Fort Riley formations, which are the producing zones in the Hugoton gas field to the west, were topped at 2604 and 2780 feet, respectively. No shows were reported. Hugoton's gas reservoirs are the dolomite beds of the lower part of the Sumner group plus the dolomite and limestone beds of the upper portion of the Chase group.[1] No reef material has been reported in any of the Hugoton wells, and the eastern limits of the field are approximately 25 miles west of the Flynn discovery.

Drilling Troubles

Drilling operations were constantly troubled by lost circulation. Almost from the start the soft formations soaked up pitfuls of heavy chemically-treated mud. Loss of mud was also a serious factor in subsequent testing operations. The contractor estimated the mud bill in the neighborhood of $10,000, which is exceptionally heavy for a well drilled to 5549 feet, total depth, using but 30 rock bits and with an elapsed drilling time of only 45 days, including time spent in making ten drill-stem tests.

First indication that the Flynn well was drilling in reef formation was observed from well cuttings shortly after the Lansing-Kansas City lime was topped at 4584 feet. The cuttings carried characteristic reef building fossils, and the formation drilled easily, at the rate of a foot in from one to two minutes. The fossil content of the cuttings increased with depth and persisted throughout the entire massive lime section to total depth.

However, at no time was the formation cored, and all analysis has been based on the well cuttings.

Unlike wells in which the same formations are encountered in the producing fields of Kansas, the massive lime section in the School Land 1 is characterized by what can only be described as "cavernous porosity." This, coupled with the unconsolidated nature of the beds, accounted for fast drilling and was responsible for the constant threat to the well posed by loss of circulation. These mud difficulties plagued the operator not only while the hole was being cut but in the numerous production tests before the well was finally turned into the tanks.

Abundance of Fossils

The lithologic nature of the cuttings cannot be stressed too strongly, as the present hypothesis that oil from the School Land 1 discovery in Beaver County is an accumulation in a reef formation comparable to similar strikes in West Texas and Canada, is based at present upon the appearance in quantity throughout the well cuttings of reef-building fossils heretofore not found in wells producing from similar formations elsewhere in Oklahoma.

A study of the electric log and a check of the drill-stem tests indicate that the entire section of lime, with but few intervals, carries oil, and that some sections above the present completion depth can produce commercially. Flynn believes later development will prove this theory, but his decision to final the well in the 5540-49 zone was actuated by the fact that the last ten feet of the section, when tested, showed commercial quantities of oil and no water.

Record of Tests

The first drill-stem test was made Nov. 18, 1951, at 4705-35 feet and recovered 1500 feet of salt water. Record of subsequent drill stem tests follows:

4771-82 feet, tool opened one hour, recovered 1410 feet of high-gravity oil and 990 feet of salt water. Bottom hole pressure 1520 pounds. (This was the first show of oil).

4788-96 feet, tool opened two hours, gas in 80 minutes, recovered 330 feet of oil and 120 feet of salt water.

4810-34 feet, tool opened two hours, recovered 120 feet of oil-cut mud and 120 feet of salt water.

4963-81 feet, tool opened one hour, recovered 180 feet of salt water.

5050-71 feet, tool opened two hours, gas in 48 minutes, recovered 360 feet of oil, 3200 feet of salt water, bottom hole pressure 1700 pounds. (Circulation was lost at 5176 feet).

5162-90 feet, packer set and with tool opened two hours, gas in 20 minutes, recovered 120 feet of oil-cut mud, 360 feet muddy oil, 980 feet foamy mixture oil, gas and salt water, 2220 feet of salt water, bottom hole pressure 1775 pounds.

5298-5316 feet, tool opened one hour, 25 minutes, recovered gas-cut mud and 3000 feet of salt water, bottom hole pressure 1850 pounds.

Final Drill-Stem Test

The final drill-stem test was taken December 5, in the Marmaton, which is at the base of the Lansing-Kansas City lime at 5540-49 feet. Gas showed in three minutes and the well started flowing oil an estimated 50 barrels of high-gravity oil an hour, no water.

After running electric log, Flynn set seven-inch production string at 5540 feet and moved in standard tools to complete the well with about ten feet of the section exposed.

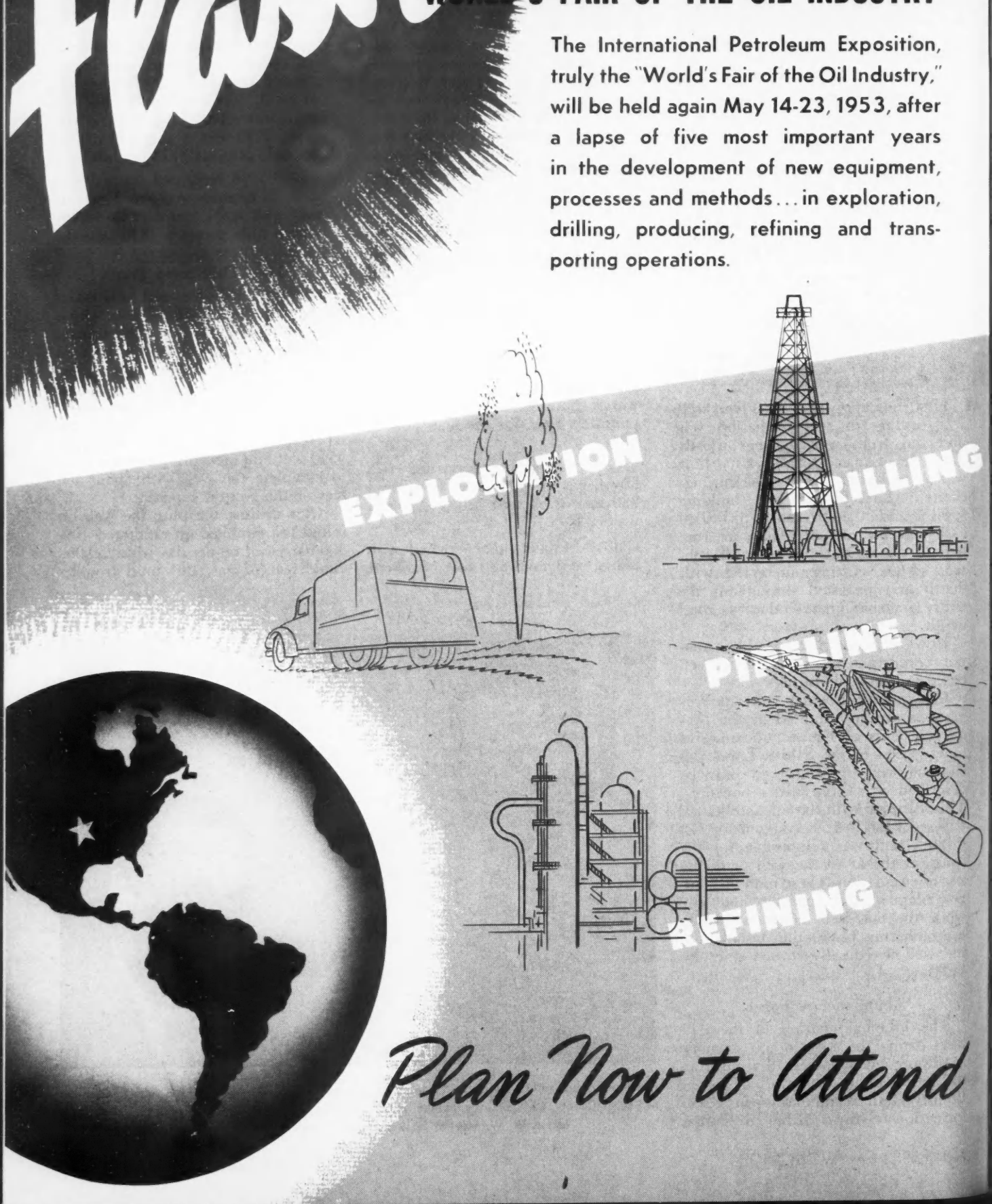
After drilling the plug the well on initial test swabbed an estimated 400-500 barrels of oil per day with 250,000 cubic feet of gas. But mud troubles

Olney F. Flynn, right, president, Flynn Oil Company, former mayor of Tulsa, whose discovery in Beaver County, Oklahoma Panhandle, may be the first reef-type production for the state. With him is W. W. Martin, Jr., his son-in-law, who supervised field work.

Flash INTERNATIONAL

WORLD'S FAIR OF THE OIL INDUSTRY

The International Petroleum Exposition, truly the "World's Fair of the Oil Industry," will be held again May 14-23, 1953, after a lapse of five most important years in the development of new equipment, processes and methods... in exploration, drilling, producing, refining and transporting operations.



Plan Now to Attend

continued to plague the operator and recoveries were erratic. Flynn believes that about 60 barrels of mud were lost to the producing formation; and in the course of testing, the formation was treated with 250 gallons of mud solvent. Test records show the well swabbed 20 barrels of oil an hour for 120 barrels in six hours, then headed and flowed 80 barrels in slightly more than an hour, and then died. On another 12-hour test crews swabbed 8½ barrels of oil an hour, gradually increasing to 20 barrels an hour. After treating with mud solvent the well recovered the load and swabbed 14½ barrels an hour.

After running tubing the well flowed through one-eighth-inch choke to fill three 500-barrel steel storage tanks. Because of the low gas volume operator put the well on pump and it is rated at 200 barrels a day or better.

Sweet Oil Producer

The Flynn well produces a sweet 40-gravity oil that has a high wax content and a pour point of 50 degrees. It is being trucked out and sold to the Shallow Water Refining Company, which processes it at its refinery in western Kansas.

Early this year Cities Service staked a direct east offset to further confirm the reef theory.

Despite the lack of geological or geophysical criteria there appears some additional evidence from which this theory can be adduced. About 20 miles east of the Flynn well a test was drilled which cut a thick shale section where the dolomite should have been encountered. Farther west but still east of the Flynn discovery another dry hole encountered the dolomite but with no lithologic evidence of reefing. The lithologic change from this well to the Flynn well adds credence to the theory of reef-building.

Lack of structural control in the general area makes theorizing hazardous at best. However, present speculation tends towards the theory that the Flynn well is located on a small noseing or embayment on the northwest flank of the Anadarko Basin and that the oil occurs in a lens or stratigraphic trap. Centering on the Flynn well, the trend may be said to extend for a distance of 35 miles to the east and 35 miles to the west. This is not to say that all wells drilled within this broad trend, which may extend into Harper County in Oklahoma, and Meade and Clark counties in Kansas, will find production. But it does seem to portend that under ideal conditions, reef material may have been deposited within this east-west belt running through those counties. Since there is no structural control, the best bet for finding production is by drilling, and the primary reason for oil accumulating is lensing porosity.

Olney Flynn's sand dune discovery is one of the "wilder" wildcat tests drilled in Oklahoma last year. Nearest production is the Light pool, about 15 miles northwest in Beaver County, where J. M. Huber Corporation of Borger, Texas, has five producers from the Chester and Morrow series in the lower Mississippian. The wells produce about 20 million cubic feet of gas daily and 160 barrels of distillates. Sixteen miles northeast of the Flynn well The Pure Oil Company appeared to have opened Morrow sand production at Albert 1, SE SE SW 16-5n-23 ecm. However, no evidences of reef conditions were reported in the Pennsylvanian beds in either the Light pool wells or the Pure wildcat. Shows in both the Kansas City and basal Marmaton limes were reported.

Lease concentrations held by major oil companies, including The Superior Oil Company of California, Sinclair Oil and Gas Company, Stanolind Oil and Gas Company, Cities Service, Huber and others, assure an active drilling campaign in the general area this year.

Oklahoma oil men admit the Flynn discovery caught them unawares. Prior to completion, leases were available at from $5 to $10 an acre a mile or so from the well. Since then, prices have jumped to about $250 an acre, with little available acreage to be had.

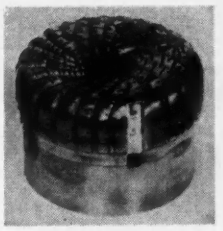
Meanwhile, although the wealthy wheat farmers and ranchers were wary of this new activity, the town of Beaver was undergoing a touch of the old-time oil fever, and a boom was developing there. Business men extended a cordial welcome to oil men, and residents were reaping a harvest of new dollars which, they hoped was the forerunner of increasingly good times. Beaver hoped in time to become the "oil capital of the Oklahoma Panhandle."

REFERENCE

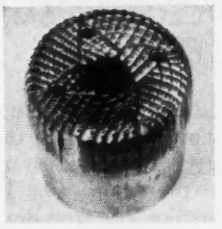
1 "Hugoton Gas Field of Kansas, Oklahoma and Texas" C. H. Keplinger, J. M. Wanenmacher and Ken R. Burns, Tulsa.

ACKNOWLEDGEMENT

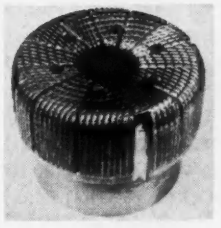
The writer is indebted to Olney F. Flynn, president, Flynn Oil Company, W. W. Martin, Jr., and D. C. Nufer, consulting geologist, for help in assembling the information contained in this article.



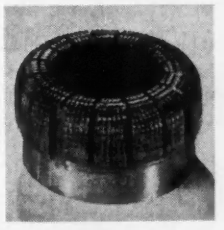
W.C.
(Spraberry) or
Soft Formation



W.G.
General Purpose

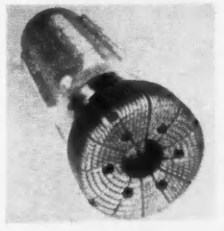


W.H.
Chert or
Quartzite



Conventional
Core Bit

Circulating Sub
with Inner
Bit in place



Circulating Sub
Assembled

DISTRIBUTED BY

DIAMOND BIT CO.

DALLAS • 3107½ Knox Ave. • LOgan 7221
MIDLAND • ODESSA AIR TERMINAL
Tel. 2-229[illegible] Tel. 7-9162
P. O. BOX 166, TERMINAL, TEXAS

BIT RENTAL SERVICE, INC.
WIRE LINE CORING CO.
MIDLAND • ODESSA
P. O. Box 166, Terminal, Texas

Invented, Designed & Mfg'd By
WILLIAMS BIT & TOOL CO.
GREENVILLE, TEXAS

Exploration 20 Percent Ahead of 1951 Record

By CECIL W. SMITH, WORLD OIL Staff

GREATER emphasis is being placed on exploratory drilling by the petroleum industry this year than ever before. The exploration pace is far out-stripping that of previous periods, particularly last year when a record high was set.

In 1952's first quarter, exploratory wells completed total almost 20 percent more than last year's comparable period. Results don't appear to have been diluted by the vast numbers, for in totals and percentage this year's drilling program is ahead of 1951's in successful tests.

In the first three months, 2480 wells, classed as exploratory, were finaled. That amount was exactly 400 wells or 19.2 percent more than the 2080 in the same period last year. The result of all those efforts and financial expenditures was 491 producing wells this year against 401 a year ago. The current successes amounted to 19.8 percent of the total drilled, while those now a year old could score only 19.3 percent of the total drilled.

Of this year's 491 successful tests, 329 opened new oil pools. A year before the record stood at 277. This year's pools consisted of 241 new fields and 88 new pools in older fields. A comparison showed 188 new fields discovered a year before, as well as 89 new pay strata in established oil fields. That showed new pays to be almost the same in the two periods, but this year's new oil fields ahead by 53 discoveries or 28.2 percent.

Discoveries of distillate pools this year totaled 29 for a gain of 70.6 percent over the 17 recorded in 1951's first quarter. A smaller increase of 13.3 percent was scored by this year's 51 new natural gas pools. A year earlier, the count had stood at 45.

Summary of Results of Exploratory Drilling

ITEM	Mar., 1952	Feb., 1951	THREE MONTHS: January-March 1952	1951	Percent Diff.
Oil Discoveries	124	102	329	277	+ 18.8
New Fields	89	74	241	188	+ 28.2
New Pays	35	28	88	89	— 1.1
Distillate Discoveries	14	3	29	17	+ 70.6
New Fields	13	3	26	12	+116.7
New Pays	1		3	5	— 40.0
Gas Discoveries	16	22	51	45	+ 13.3
New Fields	11	19	40	34	+ 17.6
New Pays	5	3	11	11	
Total Discoveries	154	127	409	339	+ 20.6
Extensions to Fields	41	20	82	62	+ 32.3
Oil Fields	34	16	70	44	+ 59.1
Distillate Fields	1	1	3	7	— 57.2
Gas Fields	6	3	9	11	— 18.2
Total Prod. Tests	195	147	491	401	+ 22.4
Dry Holes	659	578	1,989	1,679	+ 18.5
Wildcats	605	548	1,880	1,570	+ 19.7
New Pays	5		6	4	+ 50.0
Outposts	49	30	103	105	— 1.9
Total Expl'tory Tests	854	725	2,480	2,080	+ 19.2
Percent Productive	22.8	20.3	19.8	19.3	
Percent Dry	77.2	79.7	80.2	80.7	

Results of Exploratory Drilling in March and First 3 Months, 1952-1951, by Districts

State or District	MONTH OF MARCH, 1952													FIRST THREE MONTHS, 1952															
	Productive Tests										Unproductive Tests				Productive Tests									Total Productive		Unproductive Tests			Total Dry		Total Exploratory Tests	
	New Fields			New Pays			Extensions			Total Productive	Wildcats	New Pays	Outposts	Total Exploratory Tests	New Fields			New Pays			Extensions			3 Mo. 1952	3 Mo. 1951	Wildcats	New Pays	Outposts	3 Mo. 1952	3 Mo. 1951	3 Mo. 1952	3 Mo. 1951
	Oil	Dis.	Gas	Oil	Dis.	Gas	Oil	Dis.	Gas						Oil	Dis.	Gas	Oil	Dis.	Gas	Oil	Dis.	Gas									
Alabama											3			3	1									1	2	6			6	3	7	5
Arizona																													2		2
Arkansas	2									2	4		1	7	7					2				9	2	13		1	14	13	23	15
California	2			4			4		1	11	17		3	31	6			8			11		1	26	9	81		11	92	135	118	144
Colorado	1	1				1				3	12		1	16	3	1		1		1				6		35		1	36	19	42	19
Florida																										1			1		1	
Idaho																													1		1	
Illinois	3			1			3			7	32			39	8			6			7			21	12	85			85	85	106	97
Indiana	1						1			2	20			22	4						1			5	8	79			79	75	84	83
Kansas	7		1	1						9	50			59	26		4	2			1			33	47	179			179	154	212	201
Kentucky	2						1			3	10			13	4						2			6	5	24			24	24	30	29
Louisiana	3	4		2			2			11	28	1	2	42	9	6	3	6	1		2		1	28	25	77	1	3	81	67	109	92
North Louisiana	2	1					1			4	12		2	18	4	1	3	2	1		1		1	13	9	38		3	41	33	54	42
South Louisiana	1	3		2			1			7	16	1		24	5	5		4			1			15	16	39	1		40	34	55	50
Michigan	1									1	20			21	5			3		1	1			10	6	52			52	57	62	63
Mississippi	1	1				1				3	10		1	14	4	1		2		1	2			10	5	42		1	43	27	53	32
Missouri											1			1												3			3		3	
Montana											1		1	2	1		1							2	1	10		1	11	4	13	5
Nebraska											10	1	1	12	2						1			3	4	24	1	2	27	11	30	15
Nevada																													1		1
New Mexico	3			1		2	1			7	4			11	3		2	1		2	4			12	11	20	1		21	18	33	29
North Dakota							2			2	2			4	1						2			3		2			2	1	5	1
Ohio											4			4			1							1	4	9			9	7	10	11
Oklahoma	5			4			2			11	52			63	15	1	7	10		1	6			40	34	175			175	160	215	194
Pennsylvania											1			1												2			2		2	
Texas	57	7	10	19	1	1	18	1	5	119	308	3	39	469	139	17	22	45	2	3	30	3	7	268	213	924	3	82	1009	786	1277	999
Dist. 1 S. Central	2	1							1	4	23		2	29	5	1		1					1	8	9	73		4	77	46	85	55
Dist. 2 Middle Gulf	1	2	1				3	1	3	11	20		6	37	6	5	4	2			6	3	5	31	23	63		10	73	54	104	77
Dist. 3 Upper Gulf	5	3	1	11	1	1				22	22		2	46	9	6	2	17	1	3				38	28	78		2	80	61	118	89
Dist. 4 L. Gulf-SW	1		2	1			2		1	7	38	2		47	5	3	6	4	1		2		1	22	25	99	2	7	108	76	130	101
Dist. 5 E. Central	1									1	8		1	10	3									3	4	29		1	30	51	33	55
Dist. 6 Northeast	3			1						4	13		1	18	4	1		5			1			11	7	34		2	36	18	47	25
Dist. 7-B N. Cent.	16	1	3				1			21	70			91	45	1	4	1			1			52	42	203		2	205	181	257	223
Dist. 7-C W. Cent.	6			1	1		5			14	36		2	52	15		2	3			9			29	23	105		2	107	67	136	90
Dist. 8 West	7			2			6			15	33			48	14			5			9			28	21	97			97	96	125	117
Dist. 9 North	15			3			1			19	41	1	21	82	33		3	7			2			45	29	130	1	48	179	134	224	163
Dist. 10 Panhandle			1							1	4		4	9			1							1	2	13		4	17	2	18	4
Utah											6			6											1	12			12	4	12	5
West Virginia	1									1	1			2	1									1	1	1			1		2	1
Wyoming				3						3	9			12	2			4						6	11	24		1	25	25	31	36
Total U.S.	89	13	11	35	1	5	34	1	6	195	605	5	49	854	241	26	40	88	3	11	70	3	9	491	401	1880	6	103	1989	1679	2480	2080

U. S. Oil, Distillate and Gas Discoveries and Extensions in March

ARKANSAS—NEW OIL FIELDS

Ouachita County. Stephens Production Company's C. & R. Wesson 1-A, NE SE SW 3-15s-19w, pumped 13 barrels from Nacatoch sand, Upper Cretaceous 1364-73 feet, 13-gravity, completed 3-29-52, TD 1373.

Union County. Martin Wunderlich's Reynolds-Gammill Lumber Company 1, C SW NW 36-16s-17w, pumped 6 barrels oil and 95 barrels water from Smackover lime, Jurassic 6426-29 feet, completed 3-24-52, TD 6588.

CALIFORNIA—NEW OIL FIELDS

Kern County. Fairco Drilling & Development Company's Fairco 3, in 36-29s-29e, pumped 4 barrels from Chanac sand, Pliocene 420-520 feet, completed 3-7-52, TD 780.

San Luis Obispo County. Canon Drilling Company's Elk Horn 1, in 27-32s-22e, pumped 10 barrels from 582-750 feet, 25-gravity, completed 3-7-52, TD 780.

CALIFORNIA—NEW OIL PAYS

Kern County, Arvin field. Havenstrite Oil Company's Richards 2, in 22-31s-29e, flowed 110 barrels from Santa Margarita sand, Miocene 6866-911 feet, 16/64-inch, completed 2-27-52, TD 6911.

Buena Vista Hills field. Standard of California's "9-D" 503, in 9-32s-24e, flowed 132 barrels oil and 7 barrels water from Stevens "B" sand, Upper Miocene 3533-4398 feet, 30.7-gravity, 20/64-inch, completed 3-18-52, TD 4400.

Devils Den field. Gilliland Oil Company & C. O. Davis' Strode 3, in 15-25s-18e, pumped 24 barrels from Point of Rocks sand, Miocene 1668-1720 feet, completed 2-22-52, TD 3355.

Los Angeles County, Seal Beach field. Continental Oil Company's Bixby 62, in 2-5s-12w, pumped 272 barrels oil and 116 barrels water from 7995-9943 feet, completed 2-28-52, TD 12,162.

CALIFORNIA—OIL FIELD EXTENSIONS

Fresno County, Camden field. B. B. Breckenridge's Georgeson 1, in 31-16s-20e, 2/3-mile northwest extension, pumped 30 barrels from 5940-6008 feet, 32-gravity, completed 3-21-52, TD 6288.

Los Angeles County, Castaic Hills field. Continental's Harding 32-36, in 36-5n-17w, ½-mile east extension, flowed 203 barrels from Sterling sand, Upper Miocene 5337-427 feet, 33.8-gravity, 32-64-inch, completed 3-17-52, TD 5438.

Ventura County, Montalvo field. Standard of California's Pidduck 1, in 20-2n-22w, ¾-mile northeast extension, pumped 13 barrels from Repetto sand, Pliocene 9857-912 feet, 26.9-gravity, completed 3-26-52, TD 10,265.

South Mountain field. Ohio Oil Company's Norman Richardson 1, in 24-3n-21w, ¾-mile southwest extension, pumped 248 barrels from Eocene sand 5373-6959 feet, 16.4-gravity, completed 2-29-52, TD 7213.

CALIFORNIA—GAS FIELD EXTENSION

Glenn County, Willows field. Honolulu Oil Corporation's Capital 1, in 7-20n-2w, ½-mile north extension, flowed 1.4-million from Lower Willard sand, Cretaceous 2750-870 feet, open, completed 3-11-52, TD 3000.

COLORADO—NEW OIL FIELD

Logan County, "Peetz, West" field. British American Oil Producing Company's Schwake 1, NE SW NE 6-11n-52w, flowed 15 barrels from Dakota "J" sand. Cretaceous 5296-5300 feet, completed 3-1-52, TD 5666.

COLORADO—NEW DISTILLATE FIELD

Weld County. Tuley & Carter's Raymond Johnson 1, NE SE NW 29-9n-56w, flowed 65 barrels distillate and 8.6-million from Dakota "J" sand, Cretaceous 5846-50 feet, open, TD 5891.

COLORADO—NEW GAS PAY

Moffat County, Hiawatha field. Mountain Fuel Supply Company's Unit 1, in 14-12n-100w, flowed 11 million from Lance sand, Upper Cretaceous 4885-930 feet, completed 2-27-52, TD 15,041.

ILLINOIS—NEW OIL FIELDS

Jasper County, Hunt City, East field. Continental's G. E. McCoy 1, in 4-7n-14w, pumped 154 barrels oil and 16 barrels water from Fredonia lime, Mississippian 1844-50 feet, completed 3-4-52, TD 1850.

Jefferson County, Williams South field. Slivka & Son's J. W. Dare 1, NE SW SE 10-3s-2e, pumped 50 barrels from Bethel sand, Mississippian 2491-99 feet, completed 3-4-52, TD 2814.

Shelby County, Shelbyville, East field. Lynch Oil Company's F. R. Dove 1, NE NE SW 27-11n-4e, pumped 17 barrels from Aux Vases sand, Mississippian 1811-24 feet, completed 3-11-52, TD 3301.

ILLINOIS—NEW OIL PAY

Clay County, Xenia, East field. National Associated Petroleum Co.'s S. Bryan 3, NW NW NE 14-2n-5e, pumped 24 barrels from Bethel sand, Mississippian 2710-26 feet, completed 3-4-52, TD 2736.

ILLINOIS—OIL FIELD EXTENSIONS

White County, Enfield field. Ryan & Sharp's L. D. Appel 1, SW SW NW 28-5s-8e, ½-mile south extension, pumped 139 barrels from McClosky lime, Mississippian 3385-95 feet, completed 3-11-52, TD 3460.

Phillipstown, Consolidated field. E. J. Cunningham's S. Ackerman 1, SE SW SE 26-4s-10e, 1-mile extension, pumped and flowed 106 barrels from Rosiclaire lime, Mississippian 3021-28 feet, completed 3-11-52, TD 3115.

Trumbull field. G. C. Schoonmaker's J. T. Saunders Commission 1, SW NE 16-5s-9e, pumped 65 barrels from Lower O'Hara lime 3316-20 feet, Rosiclaire lime 3338-45 feet, McClosky lime, Mississippian 3369-73 feet, completed 3-18-52, TD 3462.

INDIANA—NEW OIL FIELD

Vanderburgh County. Calvert Drilling Company's Marie D. Knighton 1, SE NE NE 25-5s-11w, pumped 26 barrels oil and 23 barrels water from Pennsylvania sand, Pennsylvanian 979-85 feet, TD 985.

INDIANA—OIL FIELD EXTENSION

Gibson County, Oatsville field. Charles Clemens' Pearl Clem 1, NE NE SW 21-1s-9w, 1-mile northwest extension, pumped 15 barrels from Hardinsburg sand, Mississippian 1290-96 feet, TD 1410.

KANSAS—NEW OIL FIELDS

Barber County, Turkey Creek, North field. Aladdin Petroleum and Nadel & Gussman's National Gypsum 1-B, NE NE NE 17-30s-15w, pumped 25 barrels from Misener sand, Pennsylvanian 4540-53 feet, TD 4850.

Barton County, Frank field. Alpine Oil & Royalty Company's Hammeke 1-B, SE SE SW 7-19s-12w, pumped 75 barrels from Lansing-KC lime, Pennsylvanian 3322-28 feet, TD 3464.

Lott field. Honaker Drilling Company's Lamatsch 1, SW SW SW 26-16s-12w, pumped 50 barrels from Arbuckle lime, Ordovician 3354-70 feet, TD 3370.

Cowley County, Gibson, South field. The Texas Company's Bryant 1, SE SE NW 32-34s-3e, flowed 80 barrels from Bartlesville sand, Pennsylvanian 3383-88 feet, TD 3446.

Graham County, Dorman field. Musgrove Petroleum Corp's Dorman 1, NW NW NW 30-10s-23w, pumped 345 barrels from Lansing-KC lime, Pennsylvanian 3921-28 feet, TD 4449.

Marion County. R. W. Atkinson's Brown 1, C SL NE 33-21s-4e, pumped 10 barrels from Viola lime, Ordovician 2269-75 feet, TD 2506.

Saline County. B&R Drilling Company's Pearson 1, NW NW NW 33-16s-3w, pumped 50 barrels from Simpson lime, Ordovician 3357-68 feet, TD 3495.

KANSAS—NEW OIL PAY

Barton County, Hammer field. W. L. Hartman's Birzer 2, NW NW SW 36-19s-12w, pumped 50 barrels from Arbuckle lime, Ordovician 3353-56 feet, TD 3356.

KANSAS—NEW GAS FIELD

Seward County. Northern Ordnance, Inc's White 1, SW SW SW 36-34s-32w, flowed 0.5-million from Morrow sand, Mississippian 5906-10 feet, TD 6275.

KENTUCKY—NEW OIL FIELDS

Henderson County. J. Buchman & C. E. O'Neal's George Swann 1, SE NW SW 20-0-24, swabbed 36 barrels from Aux Vases lime, Mississippian 2412-18 feet, TD 2590.

Webster County. Basin Drilling et al's Lila T. Ramsey 1, in 16-N-23, flowed 10 barrels from Pennsylvania sand, Pennsylvanian 1395-1409 feet, TD 2783.

KENTUCKY—OIL FIELD EXTENSION

Henderson County, Midway field. Sinclair Oil & Gas Company's M. D. Eblen 1, 20-P-21, ½-mile north extension, pumped 305 barrels from McClosky lime, Mississippian 2612-23 feet, TD 2643.

NORTH LOUISIANA—NEW OIL FIELDS

Claiborne Parish, "Summerfield" field. Magnolia Petroleum Company's A. Wasson 1, C NW SE 13-22n-5w, flowed 336 barrels from Smackover lime, Jurassic 10,194-206 feet, 50.8-gravity, 10/64-inch, completed 3-13-52, TD 11,188.

Webster Parish, Springhill field. L. L. Robinson et al's Kilpatrick 1, in 6-23n-10w, flowed 168 barrels from Tokio sand, Upper Cretaceous 3104-10 feet, 41.5-gravity, ¼-inch, completed 3-11-52, TD 3153.

NORTH LOUISIANA—OIL FIELD EXTENSION

Claiborne Parish, Haynesville, Southeast field. Nelson & Edward Morris, Ltd. et al's Prestige & Martin et al Unit 1, in 10-22n-7w, ¾-mile south extension, flowed 2 barrels from 10,546-617 feet, completed 3-26-52, TD 11,350.

NORTH LOUISIANA—NEW DISTILLATE FIELD

Bienville Parish, "Bryceland, West" field. Pan Am Southern Corporation & Mil-

ton Crow, Inc's Southern Advance Bag & Paper Co. 1, flowed 4 barrels distillate and 4.8-million from Travis Peak sand, Lower Cretaceous 6917-24 feet, 3.8-inch, completed 3-7-52, TD 8030.

SOUTH LOUISIANA—NEW OIL FIELD

Cameron Parish, "Little Pecan Lake" field. Pan American Production Company's Miami Corp. 1-B, in 13-15s-4w, flowed 264 barrels from Miocene 12,508-564 feet, 34.9-gravity, ¼-inch, completed 3-13-52, TD 13,516.

SOUTH LOUISIANA—NEW OIL PAYS

Plaquemines Parish, Lake Washington field. John W. Mecom & Freeport Sulphur Company's Ernest Cockrell 1, in 35-19s-26e, flowed 195 barrels from 11,872-938 feet, 53.9-gravity, 13/64-inch, completed 3-10-52, TD 12,029.

Main Pass Block 33 field. The Texas Company's State 957-Block 33-1, State Lease 33, flowed 149 barrels from 7849-58 feet, 28.7-gravity, ⅛-inch, completed 3-31-52, TD 9294.

SOUTH LOUISIANA—OIL FIELD EXTENSION

Jefferson Parish, Lafitte field. The Texas Company's Henry Hervin Rojas et al 1, in 14-17s-24e, 1-mile northeast extension, flowed 162 barrels from Miocene 10,495-504 feet, 39.5-gravity, ⅛-inch, completed 3-28-52, TD 11,727.

SOUTH LOUISIANA—NEW DISTILLATE FIELDS

Cameron Parish. Kerr-McGee Oil Industries, Inc., & Stanolind's C. F. Henry 1, C SW SW 29-14s-9w, flowed 71 barrels distillate and 2.5-million from 9356-66 feet, 52.1-gravity, 14/64-inch, completed 3-9-52, TD 9428.

Plaquemines Parish. The Texas Company's Brandish-Johnson 3, in 20-18s-26e, flowed 18 barrels distillate and 5.8-million from 10,937-949 feet, 39.1-gravity, ¼-inch, completed 3-4-52, TD 13,074.

Terrebonne Parish. Cities Service Oil Company's Delta Securities Company 1, in 37-17s-18e, flowed 72 barrels distillate and 4.5-million from 12,675-685 feet, 45-gravity, 13/64-inch, completed 3-31-52, TD 12,973.

MICHIGAN—NEW OIL FIELD

Van Buren County. Stuart R. Godfrey's Fragoules 1, SW SW NW 14-2s-16w, Bangor township, pumped 5 barrels from Traverse lime, Devonian 1045-52 feet, TD 1052.

MISSISSIPPI—NEW OIL FIELD

Adams County, "Kingston, North" field. J. P. Evans et al's A. K. Ellis 1, in 12-5n-2w, flowed 132 barrels from Harmon sand, Eocene 6507-11 feet, 37.8-gravity, ⅛-inch, completed 3-21-52, TD 7109.

MISSISSIPPI—NEW DISTILLATE FIELD

Monroe County, "Muldon" field. Union Producing Company's J. T. Sanders 1 (OWWO), in 22-15s-6e, flowed 74 barrels distillate and 7.4-million from Hartselle sand, Eocene 5270-5505 feet, 66.2-gravity, 7/16-inch, completed 3-1-52, TD 6060.

MISSISSIPPI—NEW GAS PAY

Adams County, Stanton field. Austin E. Stewart et al's Lettie Proby et al 1, in 41-8n-1w, flowed 24-million from Wilcox sand, Eocene 3980-82 feet, open, completed 3-6-52, TD 6165.

NEW MEXICO—NEW OIL FIELDS

Lea County. Jackson-Douglas & Ritchie's State 1, in 27-10s-32e, flowed 240 barrels from Pennsylvania sand, Pennsylvanian 8390-8450 feet, 45.2-gravity, 16/64-inch, completed 2-22-52, TD 10,189.

Unnamed field. Phillips Petroleum Company's Pello 1-B, in 20-14s-32e, flowed 178 barrels from Pennsylvania sand, Pensylvanian 9542-64 feet, 40.5-gravity, ½-inch, completed 2-25-52, TD 10,294.

Roosevelt County. Austral Oil Development Company's M. H. McCreil 1, in 18-8s-38e, flowed 105 barrels from San Andres lime, Permian 4598-4798 feet, 26-gravity, open, completed 2-24-52, TD 4802.

NEW MEXICO—OIL FIELD EXTENSION

Lea County, Skaggs field. C. H. Sweet's Alice Sidall 1, in 7-20s-38e, 1-mile north extension, pumped 10 barrels from Grayburg sand, Permian 3603-3958 feet, 36-gravity, completed 2-27-52, TD 3958.

NEW MEXICO—NEW GAS PAYS

Rio Arriba County, Lindrith field. Magnolia's Hammond 1, C SE SE 22-24n-3w, flowed 0.1-million from Pictured Cliffs sand, Upper Cretaceous 3212-90 feet, ¼-inch, completed 3-4-52, TD 3290.

San Juan County, Kutz field. Stanolind's Angel Peak 1, SE NE NE 15-27n-10w, flowed 0.1-million from Dakota sand, Cretaceous 6560-70 feet, completed 3-3-52, TD 8043.

NORTH DAKOTA—OIL FIELD EXTENSIONS

Williams County, Beaver Lodge field. Amerada Petroleum Corporation's Josie Knutson 1, C NE NE 36-156n-96w, 1¾-mile northwest extension, flowed 540 barrels oil and 20 barrels water from Madison lime, Mississippian 8472-8500 feet, 43.2-gravity, ¼-inch, TD 8612.

Beaver Lodge, Northeast field. Amerada's Clif Nylander 1, C SW NE 15-156n-95w, ½-mile east extension, Madison lime, Mississippian 8241-8473 feet, TD 8596.

OKLAHOMA—NEW OIL FIELDS

Osage County. Frank Buttram's Osage (Kipp) 1, NE SW SW 17-22n-8e, flowed 204 barrels from Skinner sand, Pennsylvanian 2425-41 feet, 38-gravity, ¼-inch, TD 2441.

Payne County. Delta Petroleum Corporation et al's Rein Estate 1, SE NE NE 31-19n-2e, flowed 194 barrels from Misener sand, Pennsylvanian 4654-65 feet, 43.5-gravity, 18/64-inch, TD 4930.

Pontotoc County. Bert Paine's Busby Community 1, SW SW NW 29-4n-5e, pumped 48 barrels from Viola lime, Ordovician 1464-84 feet, 31-gravity, TD 1662.

Stephens County, Black Bear Creek field. Mack Oil Company's Sledge 1, NE NW NE 23-2n-5w, flowed 999 barrels from Hoxbar sand, Pennsylvanian 4000-16 feet, 44-gravity, 23/64-inch, TD 5515.

Unnamed field. Atlantic Refining Company's J. F. Crawford 1, SW NW SE 31-2s-6w, flowed 103 barrels oil and 100 barrels water from Canyon lime, Pennsylvanian 2594-2604 feet, 23-gravity, 17/64-inch, TD 2956.

OKLAHOMA—NEW OIL PAYS

Grady County, Cement, East field. Sunray Oil Corp's J. R. Wood 1 (OWWO), SE SE SW 1-4n-8w, pumped 9 barrels from Fortuna sand, Permian 2180-2200 feet, 38-gravity, TD 10,196.

Pawnee County, Blackburn, East field. W. B. Moran's Canfield 1, NE SW NE 21-22n-7e, pumped 72 barrels from Arbuckle dolomite, Ordovician 2975-82 feet, 33-gravity, TD 3202.

Payne County, Paradise field. Blackwell Oil & Gas Company's Stewart 1, NW NW SW 21-18n-1e flowed 6 barrels from Bartlesville sand, Pennsylvanian 4747-68 feet, 37-gravity, TD 5260.

Stephens County, Velma field. An-son Petroleum Corporation's Mrs. L. H. Prichard 1, SW SW SW 4-2s-4w, flowed 168 barrels from 2nd Lower Fusilinid sand, 4098-4106 feet, 33-gravity, ¼-inch, TD 4888.

OKLAHOMA—OIL FIELD EXTENSIONS

Osage County, Unnamed field. A. G. Oliphant's Osage 2, SW SW NW 3-25n-3e, ¾-mile west extension, pumped 30 barrels oil and 90 barrels water from Layton sand, Pennsylvanian 2573-87 feet, TD 4050.

Pottawatomie County, Burnett field. Sunray's Johnson 1, NE NW NW 28-8n-2e, 1-mile south extension, pumped 126 barrels from Haragan-Hunton lime, Mississippian 5274-5380 feet, 19-gravity, TD 6163.

TEXAS DISTRICT 1—NEW OIL FIELDS

Atascosa County. R. B. Wherry & C. A. Green's A. Terrell 1, CEPI & Mfg. Co. Survey, pumped 91 barrels from Recklaw sand, Eocene 1692-1702 feet, 19.1-gravity, completed 3-22-52, TD 1750.

Bell County. Pryor Dillard's A. H. Safford 1-B, William Woodford Survey, pumped 9 barrels from Buda lime, L. Cretaceous 1090-1103 feet, 22.5-gravity, completed 3-10-52, TD 1338.

TEXAS DISTRICT 1—NEW DISTILLATE FIELD

McMullen County. Jake L. Hamon's D. W. Rhode 1, Alfred Spalding Survey, flowed 91 barrels distillate and 22-million from Wilcox sand, Eocene 7463-80 feet, 59.4-gravity, open, completed 3-3-52, TD 7530.

TEXAS DISTRICT 2—OIL FIELD EXTENSIONS

Goliad County, Gottschalt field. F. William Carr's Emma Haynes 1, H. T. Callihan Survey, ½-mile north extension, flowed 143 barrels from Mackhank sand, Eocene 7620-24 feet, 32.6-gravity, 11/64-inch, completed 3-28-52, TD 7880.

Victoria County, Cologne field. Monterey Oil Co. of Texas' L. A. Schmidt 2, Pedro Gallardo Survey, 1-mile southwest extension, flowed 30 barrels from Frio sand, Oligocene 4658-68 feet, 26.5-gravity, 6/64-inch, completed 3-31-52, TD 5050.

Helen Gohlke field. Sun Oil Company's Charles Kuester 1, I. R. R. Co. Survey, ¾-mile southeast extension, flowed 152 barrels from Wilcox sand, Eocene 8142-50 feet, 33-gravity, ⅛-inch, completed 3-17-52, TD 8156.

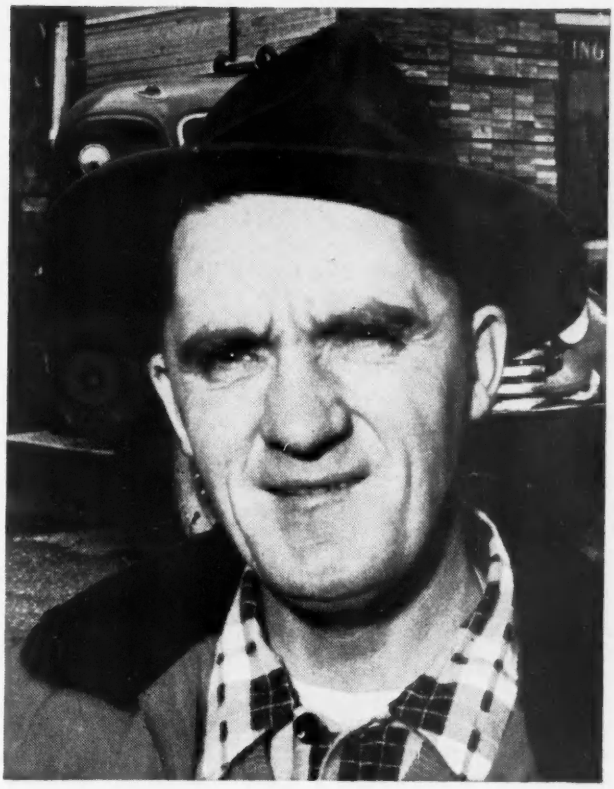
TEXAS DISTRICT 2—NEW DISTILLATE FIELDS

DeWitt County. Kirkwood & Company's A. G. Drier 1, Patrick Dowlearn Survey, flowed 18 barrels distillate and 7.4-million from 8265-90 feet, 51-gravity, completed 3-18-52, TD 8750.

Refugio County. Ginther, Warren & Ginther et al's Mary Riester Vincent 2, Anna Jackson Survey, flowed 2 barrels distillate and 19-million from Sinton sand, Oligocene 4788-4812 feet, 54.5-gravity, completed 3-28-52, TD 6092.

TEXAS DISTRICT 2—DISTILLATE FIELD EXTENSION

Live Oak County, Clayton field. Shell Oil Company's Block 72-1, S. B. Turner Survey, ⅞-mile west extension, flowed



"What do you do with all the money you make?"

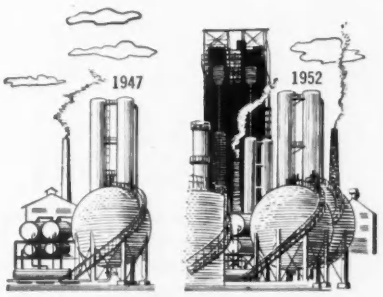
Standard's income *sometimes raises such comments as: "You people do a lot of business. You must be rolling in dough. What do you do with all the money you make?"*

The answer is a matter of public record. But in brief—after we've paid for materials, wages, employee benefits, and miscellaneous expenses . . . wear and tear on plants and equipment . . . interest on our long-term debts . . . and, in the last 5 years, more than $405,000,000 in taxes—then what's left, the "money we make," goes this way:

We invest in research and technical service — more than $35,000,000 in the last 5 years—to develop better ways of finding oil, increasing the yield, cutting costs, creating new business. That brings you new and improved products, with prices held down as we compete for your patronage.

Exploration here and abroad has cost us more than $229,000,000 in the last 5 years. Known crude reserves are at an all-time high. But these deposits were the easiest to discover. Though the earth holds vast hidden reserves, it now costs millions to find each new field, to assure continuing supplies.

And finally, after setting aside funds for future operation, our more than 100,000 shareholders get what money remains—last year $2.60 a share, their return on savings invested in Standard. So almost all the "money we make" goes right back into circulation.



We put funds into facilities—in the last 5 years, more than $644,000,000. The need for oil products keeps growing. Standard must replace old wells, increase crude production; add to the capacity of refineries, pipelines, tankers, and all other things we need to serve you well.

STANDARD OIL COMPANY OF CALIFORNIA

• plans ahead to serve you better

13 barrels distillate and 24-million from Slick sand, Eocene 6458 feet, 53.5-gravity, and 57 barrels distillate and 10-million from Wilcox sand, Eocene 6953-74 feet, 59.7-gravity, ⅜-inch, completed 3-15-52, TD 7901.

TEXAS DISTRICT 2—GAS FIELD EXTENSION

Calhoun County, Long Mott, South field. Quintana Petroleum Corp's Lillie I. Roemer 1, Matias Curvier Survey, ½-mile northeast extension, flowed 8.5-million from Frio sand, Oligocene 7390-7424 feet, open, completed 3-5-52, TD 8990.

TEXAS DISTRICT 3—NEW OIL FIELDS

Brazoria County. The Texas Company's John W. Harris et al 1, Asa Brigham Survey, flowed 213 barrels from Lower Frio sand, Oligocene 10,610-617 feet, 38.7-gravity, 14/64-inch, completed 3-4-52, TD 11,955.

Hardin County, Doty & Jackson field. J. P. Owen's Doty & Jackson 2, W. N. Cox League, flowed 135 barrels from 6268-70 feet, 38.4-gravity, 9/64-inch, and 96 barrels from 6408-09 feet, 36.5-gravity, 9/64-inch, completed 3-20-52, TD 7518.

Harris County. M. T. Halbouty and Sorrelle & Sorrelle's W. D. Rogers Unit 1, M. Duncan Survey, flowed 120 barrels from Yegua sand, Eocene 8948-64 feet, 33.6-gravity, ¼-inch, completed 3-11-52, TD 9957.

Wharton County, "Magnet-Withers, East" field. J. M. Flaitz's Lehman Unit 1, Block 63, Missouri-Lincoln Trust Co. Re-Subdivision, Joseph Clements Survey, flowed 69 barrels from 5677-79 feet, 27.2-gravity, 12/64-inch, completed 3-25-52, TD 7615.

TEXAS DISTRICT 3—NEW OIL PAYS

Fort Bend County, Fulshear field. Ginther, Warren & Ginther's Mrs. Ethel Tucker Christian 1, I&GN Survey, flowed 116 barrels from 7512-15 feet, 36.6-gravity, ⅛-inch, completed 3-7-52, TD 7850.

Hardin County, Beech Creek field. Harry Hampton's Olive Sternenberg 1, John Taylor Survey, flowed 48 barrels from Yegua sand, Eocene 6235-36 feet, 46-gravity, ⅛-inch, completed 3-3-52, TD 7227.

Harris County, Clinton field. H. R. Smith et al's T. J. Locke et al Unit 1, Reels & Trobough Survey, flowed 120 barrels from Vicksburg sand, Oligocene 6671-76 feet, 37.5-gravity, 7/64-inch, completed 2-29-52, TD 6775.

Humble field. L. D. Cain's Bender Lease 2, W. B. Adams Survey, pumped 69 barrels from 3782-3820 feet, 32-gravity, completed 3-8-52, TD 5015.

Jefferson County, Nome field. Sun's Hugh Long 1, John Blair Survey, flowed 157 barrels from 7473-77 feet, 45.6-gravity, ⅛-inch, completed 3-12-52, TD 8000.

Liberty County, Hull field. American Republics Corp. & Houston Oil Co's William Smith Fee 19, William Smith Survey, flowed 213 barrels from EY-1B sand, Eocene 8934-44 feet, 30-gravity, 12/64-inch, completed 3-27-52, TD 8944.

Madison County, Fort Trinidad field. The Texas Company's W. M. Forrest 1 (OWDD), Samuel Larry Survey, flowed 284 barrels from 9080-9200 feet, 42-gravity, 16/64-inch, completed 3-10-52, TD 9200.

Tyler County, Hicksbaugh field. Midstates Oil Corp's J. T. Wurtsbaugh 1, William S. Brown Survey, flowed 179 barrels from 8413-31 feet, 47-gravity, 9/64-inch, completed 3-14-52, TD 8926.

Wharton County, Boling field. M. T. Halbouty's J. B. Gary Estate "A" & "B" 2-A, S. F. Austin & Seth Ingram League, flowed 157 barrels from "F-7" sand, Oligocene 6710-26 feet, 26.5-gravity, 9/64-inch, completed 3-22-52, TD 6797.

TEXAS DISTRICT 3—NEW DISTILLATE FIELDS

Colorado County. Robert Mosbacher's D. Nebbe 1, SA&MGRR Survey, flowed distillate and 8.3-million from Wilcox sand, Eocene 8785-8815 feet, 54-gravity, open, completed 2-14-52, TD 9250.

Newton County. Houston Oil Co. et al's J. H. Kurth Jr., Trustee et al 1, H&TC RR Survey, flowed 100 barrels distillate and 21-million from Yegua sand, Eocene 7462-66 feet, 61.8-gravity, open, completed 3-6-52, TD 8300.

TEXAS DISTRICT 3—NEW DISTILLATE PAY

Jefferson County, Big Hill field. Adams & Haggarty's Paraffine Oil Company 1, T&NO RR Survey, flowed 13 barrels distillate and 34-million from Marginulina sand, Oligocene 8240-72 feet, 45.8-gravity, open, completed 3-8-52, TD 8311.

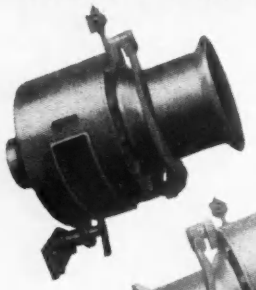
TEXAS DISTRICT 3—NEW GAS FIELD

Colorado County. Sinclair's H. R. Houck-Tract 1-A (OWWO), Section 53, I&GN Survey, flowed 50-million from Miocene sand, Miocene 2573-93 feet, open, completed 3-13-52, TD 11,705.

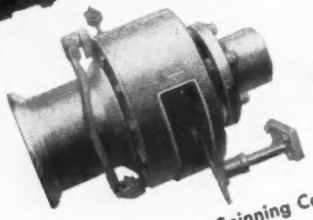
TEXAS DISTRICT 4—NEW OIL FIELD

Duval County. Pontiac Refining Com-

FOSTER SAFE CATHEADS



Air Master Breakout Cathead



Air Spinning Cathead

When we began building catheads over a quarter century ago, personal experience had taught us the importance of designing safety into every detail of our catheads.

For instance, on our air-controlled catheads a quick release valve releases the clutch instantaneously; on spinning catheads the spinning line is *not* hand wrapped; it will not foul and wind up; the driller stays at his position.

On breakout catheads are other special safety features.

Now a new and important safety feature, the Foster Safety Rope Guard, which can be attached to any Foster Friction Cathead, is available. Write for details.

Complete details on our line of catheads for every need are given in the Composite Catalog.

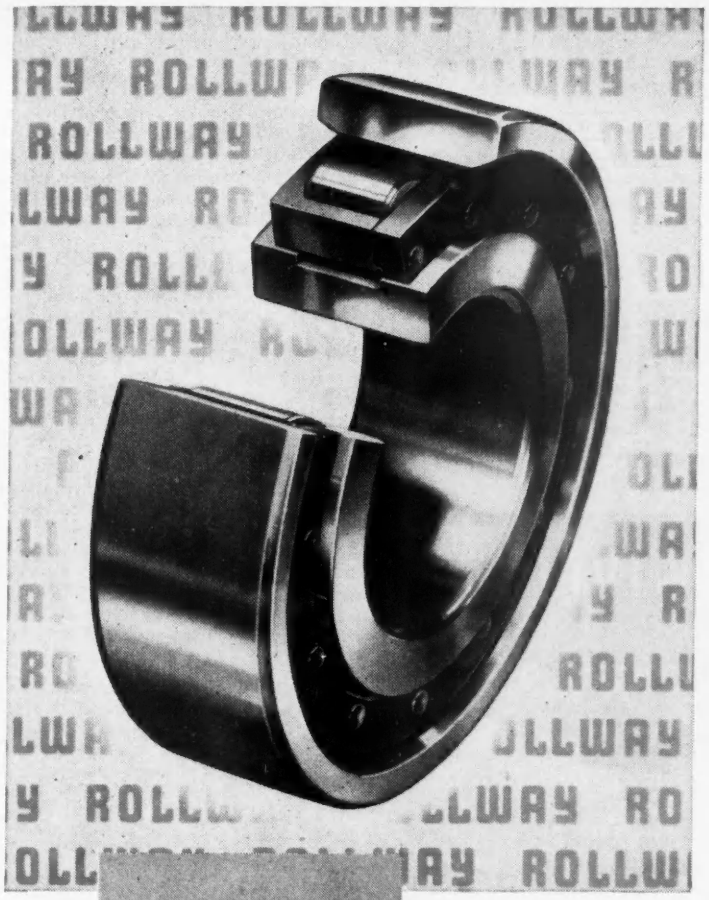
Here are features on both the Air Master Breakout and Air Spinning Catheads: Precise control . . . No adjustments . . . Direct diaphragm actuated . . . Instant disengagement . . . Crawl free drum . . . Fully enclosed . . . Quick change jerkline . . . Peak performance.

PLUS . . . Triple plate clutch on the Air Master Breakout . . . and single plate friction clutch for line pulls up to 12,000 lbs. on the Air Spinning Cathead.

There's a Foster Cathead for Every Need.

SOLD THRU SUPPLY STORES EVERYWHERE

Foster CATHEAD COMPANY
P O BOX 1675 WICHITA FALLS, TEXAS
FACTORY REPRESENTATIVES
O W Frogge, Casper, Wyo. — Greenhead Service Co, Oklahoma City, Okla. — Tillery & Parks, Odessa, Texas — R D Cloninger, Lafayette, La. — R. N. Bean, Los Angeles 15, Cal

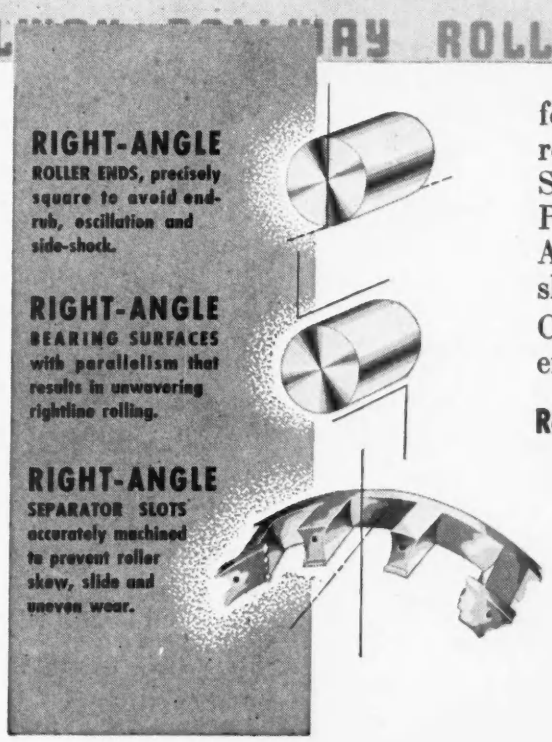


In-Built Trueness...

basis for longer life and lower cost!

Unwavering right-line rotation . . . that's the immediate result of in-built trueness in Rollway roller bearings. There's no skew, no side-shock, no roller-end-drag. Internal forces are balanced by matchless precision in related parts. Bores are precisely cylindrical. Separator surfaces are rigorously parallel. Roller ends are truly square on every diameter. And bearing surfaces match both the separator slots and the roller races.

Over the long run, life expectancy is greatly extended. Cost per unit of time falls sharply.


RIGHT-ANGLE
ROLLER ENDS, precisely square to avoid end-rub, oscillation and side-shock.
RIGHT-ANGLE
BEARING SURFACES with parallelism that results in unwavering rightline rolling.
RIGHT-ANGLE
SEPARATOR SLOTS accurately machined to prevent roller skew, slide and uneven wear.

Rollways Roll Right Because They're Made Right

Let our engineers help you to select the Rollway bearing that is exactly right for your application. Our years of specialized bearing experience and complete engineering and metallurgical service are always at your command. No cost. No obligation.

Nationwide Replacement Service: Rollway bearings are available for replacement through authorized bearing distributors in principal cities. To locate, consult classified 'phone directories under BEARINGS. Rollway Bearing Co., Inc., Syracuse 4, N.Y.

SALES OFFICES

SYRACUSE	DETROIT
PHILADELPHIA	CLEVELAND
BOSTON	LOS ANGELES
PITTSBURGH	HOUSTON

ROLLWAY BEARINGS

Complete Line of Radial and Thrust Cylindrical Roller Bearings

pany's LeRoy Denman 1, Lot 2, Block 14, Realitos Subdivision, flowed 77 barrels from Hiawatha sand, Eocene 5050-56 feet, 46.2-gravity, 7/64-inch, completed 3-13-52, TD 5205.

TEXAS DISTRICT 4—NEW OIL PAY

Nueces County, Bailey field. Pan American Production Company's Luruth Smith Rivers 3, Rafael Garcia Survey, flowed 69 barrels from 5455-60 feet, 39.6-gravity, 6/64-inch, completed 3-25-52, TD 6100.

TEXAS DISTRICT 4—OIL FIELD EXTENSIONS

Duval County, Gruy field. Daubert & Achning's J. M. Bennett 3, Survey 150, pumped 27 barrels from Jackson sand, Eocene 2628-46 feet, 27-gravity, completed 3-16-52, TD 2725.

Jim Wells County, Premont, North field. Sunray's Esubio Perez 1, SK&K Survey, ⅝-mile north extension, pumped 5 barrels from Frio sand, Oligocene 3612-18 feet, 22.9-gravity, completed 3-20-52, TD 3755.

TEXAS DISTRICT 4—NEW GAS FIELD

Hidalgo County. Houston Oil Co. & American Republics Corp's Temple W. West et al 1, Porcion 74, flowed 63-million from Vicksburg sand, Oligocene 6048-58 feet, completed 3-12-52, TD 6703.

TEXAS DISTRICT 4—GAS FIELD EXTENSION

San Patricio County, Sinton, Southwest field. Wymore Oil Company's Auld-Goldston 1, McCauley Survey, ½-mile south extension, flowed 17.5-million from Catahoula sand, Oligocene 3330-33 feet, open, completed 3-8-52, TD 3370.

TEXAS DISTRICT 5—NEW OIL FIELD

Navarro County. Humble Oil & Refining Company's R. D. Grantham et al 1, Robert Caradine Survey, pumped 99 barrels oil and 343 barrels water from Woodbine sand, Upper Cretaceous 3376-79 feet, 32-gravity, completed 3-16-52, TD 3412.

TEXAS DISTRICT 6—NEW OIL FIELDS

Bowie County, Dalby Springs field. American Liberty Oil Company et al's T. A. Jackson 4, T&PRR Survey, pumped 256 barrels from Paluxy sand, Lower Cretaceous 4370-72 feet, 20-gravity, open, completed 3-20-52, TD 4372.

Smith County. Bobby Manziel's Will McGinnis 1, S. J. Lott Survey, pumped 25 barrels from Lower Pettit lime, Lower Cretaceous 8050-60 feet, 41-gravity, completed 3-6-52, TD 8284.

Wood County, McCrary field. Sun's R. H. McCrary 1, A. Howington Survey, pumped 222 barrels from Sub-Clarksville sand, Upper Cretaceous 4408-18 feet, 20-gravity, completed 3-4-52, TD 4420.

TEXAS DISTRICT 6—NEW OIL PAY

Wood County, Yantis field. Humble's Mattie Heard et al 1, H. H. Arnold Survey, flowed 28 barrels oil and 4 barrels water from Heard sand, Lower Cretaceous 8060-70 feet, 50.4-gravity, ½-inch, completed 3-9-52, TD 8192.

TEXAS DISTRICT 7-C—NEW OIL FIELDS

Reagan County. L. F. Oil Company's B. R. Greathouse 1, Section 44, Block C, L&SV Survey, pumped 235 barrels from Spraberry sand, Permian 6640-7035 feet, 37.4-gravity, completed 3-24-52, TD 7586.

Runnels County. American Trading & Production Company's Deitz Brothers 1, N. Travis Survey, flowed 157 barrels from McMillan sand, Pennsylvanian 2449-52 feet, 46.6-gravity, ½-inch, completed 3-30-52, TD 2555.

Unnamed field. Geo-Chemical Surveys' G. M. Wood 1, A. Losoya Survey, flowed 121 barrels from Upper Gardner sand, Pennsylvanian 3843-47 feet, 44-gravity, 20/64-inch, completed 3-13-52, TD 4057.

Runnels County. Humble's G. W. Poe 1, CTRR Survey, flowed 408 barrels from Goen lime, Pennsylvanian 4440-48 feet, 45.3-gravity, ¼-inch, completed 3-20-52, TD 4448.

Unnamed field. Susan Petroleum Company et al's Dora Mitchell et al 1, S. F. Boyle, C. C. Phillips & Humphrey Survey, flowed 124 barrels from Fry sand, Pennsylvanian 4346-49 feet, 43-gravity, 14/64-inch, completed 3-17-52, TD 4355.

Tom Green County. The Texas Company's Isaac Funk 1, Section 10, Block 5, H&TC Survey, pumped 29 barrels from San Andres lime, Permian 853-60 feet, 34.2-gravity, completed 2-28-52, TD 860.

TEXAS DISTRICT 7-C—OIL FIELD EXTENSIONS

Crockett County, Wyatt field. John L. Green Drilling Company, Inc's George Bean 2, Section 35, Block UV, GC&SF Survey, ½-mile north extension, pumped 37 barrels from San Andres lime, Permian 1214-40 feet, 35-gravity, completed 3-18-52, TD 1240.

Unnamed field. Lloyd H. Smith, Inc.'s J. F. Nunn 1, Section 44, Block 36, T-5-S, T&P Survey, 2-mile south extension, flowed 332 barrels from Spraberry sand,

KING "50-XV" SWIVEL

FINEST IN THE FIELD

A swivel for drilling medium depth oil wells, deeper water wells, workover rigs, slim hole drilling and "drilling in" oil wells by the reverse circulation method.

Check these features of the 50-XV King Type Swivel:

OVERSIZED WATER COURSES assure larger fluid volume.

MOLDED RUBBER PACKINGS eliminate stuffing boxes.

HARDENED WEAR BUSHINGS eliminate wash pipes.

THE PACKING AND WEAR-BUSHINGS can be renewed within a very few minutes without removing any other part from the swivel.

ANGULAR CONTACT BALL BEARINGS provide ample thrust capacity and insure radial stability.

ALLOY STEEL CONSTRUCTION assures safety with minimum weight.

CLOSED HOUSING PROTECTS BEARINGS.

Export: R. S. Stokvis & Sons Inc.
17 Battery Place
New York, N. Y.

See your latest Composite Catalog for information on other King products.

KING OIL TOOLS

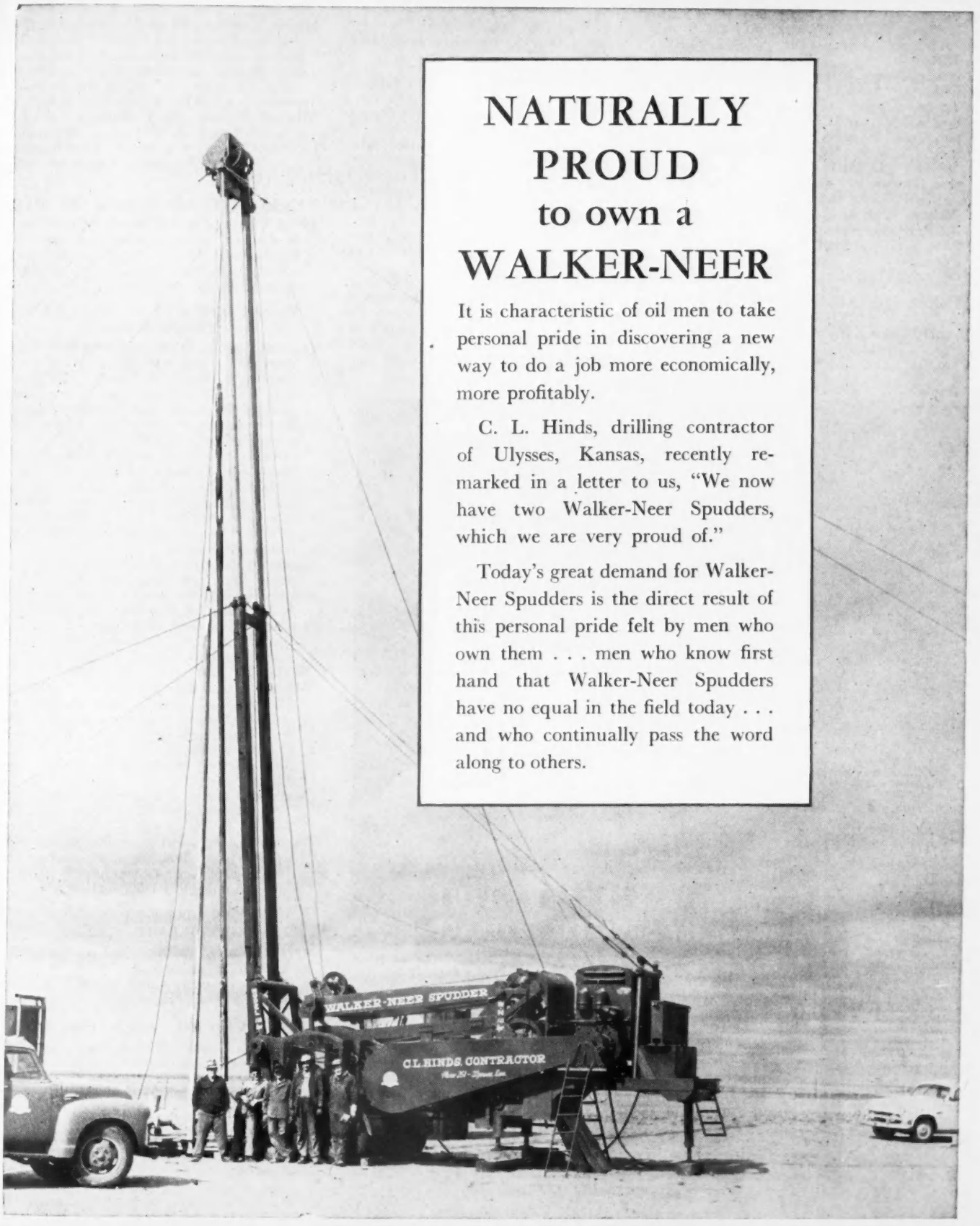
210 TERMINAL ST. HOUSTON 20, TEXAS OSage 3-3421

NATURALLY PROUD to own a WALKER-NEER

It is characteristic of oil men to take personal pride in discovering a new way to do a job more economically, more profitably.

C. L. Hinds, drilling contractor of Ulysses, Kansas, recently remarked in a letter to us, "We now have two Walker-Neer Spudders, which we are very proud of."

Today's great demand for Walker-Neer Spudders is the direct result of this personal pride felt by men who own them . . . men who know first hand that Walker-Neer Spudders have no equal in the field today . . . and who continually pass the word along to others.



Walker-Neer MACHINE COMPANY

SPUDDERS PULLING UNITS ROTARIES

P. O. Box 2490—Wichita Falls, Texas

Permian 6651-7625 feet, 40.1-gravity, 24/64-inch, completed 3-13-52, TD 7625.

Runnels County, McMillian field. Miami Operators, Inc's C. L. James 1, Norvell Travis Survey, 1-mile west extension, flowed 197 barrels from Upper McMillian sand, Pennsylvanian 2464-2510 feet, 43-gravity, 12/64-inch, completed 3-22-52, TD 2510.

Upton County, Pembrook, North field. Anderson-Prichard Oil Corporation's V. P. Tippett 1, Section 41, Block 38, T-5-S, T&P Survey, 3-mile west extension, flowed 292 barrels from Spraberry sand, Permian 7210-15 feet, 37.2-gravity, 24/64-inch, TD 8226.

TEXAS DISTRICT 7-C—NEW GAS FIELD

Runnels County. E. K. & E. M. Burt & West Central Drilling Company's J. G. Goetz 1, J. C. McKean Survey, flowed 11-million from Caddo lime, Pennsylvanian 4390-4490 feet, completed 3-17-52, TD 4580.

TEXAS DISTRICT 8—NEW OIL FIELDS

Gaines County. Cactus Drilling Corporation's Knight 1, Section 8, Block A-22, PSL Survey, pumped 134 barrels from Glorietta lime, Permian 5965-6004 feet, 32-gravity, completed 3-26-52, TD 6500.

Hockley County. L. F. Oil Company's Henry Mahoney 1, Section 53, Block P, C&M Survey, pumped 39 barrels from Clearfork lime, Permian 5822-5917 feet, 25.7-gravity, completed 3-23-52, TD 5947.

King County. Stanolind's & Ard Drilling Company's R. B. Masterson 14, Section 18, Sam Lazarus Survey, pumped 146 barrels from Canyon sand, Pennsylvanian 4082-86 feet, 34.8-gravity, open, completed 3-6-52, TD 4439.

Martin County. Ryan Consolidated Petroleum Corporation's Willie Peters 1, Section 111, Block 36, T-1-S, T&P Survey, pumped 8 barrels from Spraberry sand, Permian 7077-7198 feet, 36.8-gravity, completed 3-6-52, TD 7198.

Mitchell County. W. J. Rasnick's W. L. Elwood Estate 2, Section 4, Block 16, SPRR Survey, pumped 61 barrels from 130-32 feet, 18-gravity, completed 3-8-52, TD 132.

TEXAS DISTRICT 8—NEW OIL PAY

Ward County, Ward, South field. Lloyd R. French, Junior's Moody 4, Section 32, Block 34, H&TC Survey, flowed 110 barrels from 2674-85 feet, 32.4-gravity, ¾-inch, completed 3-19-52, TD 2685.

TEXAS DISTRICT 8—OIL FIELD EXTENSIONS

Dawson County, Spraberry-Deep field. Seaboard Oil Company's H. J. Woodul 1, Section 34, Block 34, T-5-N, T&P Survey, 1½-mile northwest extension, pumped 61 barrels from Spraberry sand, Permian 6643-6910 feet, 40-gravity, completed 3-11-52, TD 8347.

Gaines County, Tex-Mex field. E. C. Hitchcock & Son's P. S. Dunbar 1-B, Section 5, Block A-28, PSL Survey, 1-mile southeast extension, flowed 158 barrels from San Andres lime, Permian 4310-60 feet, 31-gravity, 1/64-inch, completed 3-19-52, TD 7264.

Glasscock County, Weiner-Floyd field. Sohio Petroleum Company's E. P. Williams et al 2, Section 19, Block 36, T-5-S, T&P Survey, 1 ¾-mile east extension, flowed 657 barrels from Spraberry sand, Permian 6790-7710 feet, 40-gravity, 7/16-inch, completed 3-13-52, TD 7780.

Midland County, Germania field. Hassie Hunt Trust's Howard Brooks 1, Section 48, Block 37, T-1-S, T&P Survey, 1-mile northwest extension, pumped 97 barrels oil and 19 barrels water from Spraberry sand, Permian 7185-7289 feet, 38.9-gravity, completed 3-2-52, TD 7289.

Midland County, Hi-Lonesome field. The Texas Company's C. Scharbauer 2-D, Section 19, Block 39, T-2-S, T&P Survey, ¾-mile south extension, flowed 124 barrels from Bend lime, Pennsylvanian 10,682-716 feet, 43.8-gravity, 20/64-inch, completed 3-1-52, TD 10,730.

TEXAS DISTRICT 10—NEW DISTILLATE FIELD

Gray County. Phillips' Hobart Ranch 1, Section 26, Block 3, I&GN Survey, flowed 11 barrels and 3.2-million from 8355-74 feet, TD 10,001.

WEST VIRGINIA—NEW GAS FIELD

Randolph County. Nollem Oil & Gas Corporation's Goff-Arnold Land Company 1, Roaring Creek district, flowed 0.6-million from 5th sand, 2204-2810 feet, TD 2810.

WYOMING—NEW OIL PAYS

Hot Springs County, Zimmerman Butte field. Pacific Western's Unit 9, SE NW SW 36-44n-93w, pumped 144 barrels from Phosphoria lime, Permian 4216-48 feet, TD 5465.

Johnson County, Meadow Creek field. Continental's Unit 98, SE NE NW 11-41n-78w, flowed 180 barrels from Tensleep sand, Pennsylvanian 8982-9050 feet, ½-inch, completed 3-20-52, TD 10,726.

Sussex, West field. Continental's Unit 2 (OWDD), NW NW SE 6-42n-79w, swabbed 240 barrels from Lakota sand, Cretaceous 5884-5906 feet, 34.8-gravity, completed 3-18-52, TD 6016.

Section of an Abrams Aerial Mosaic: Scale 1"=1000'.

Where A STRAIGHT LINE is not the SHORTEST DISTANCE

On this aerial photograph the dotted line shows where a proposed pipeline would have been routed using conventional maps. The solid line shows the actual route based on an Abrams Aerial Mosaic. Aerial photography instantly showed that bending the line would eliminate crossing a stream, expensive resort property and a small lake —that, measured in time and money, a straight line here was not the shortest distance. Save your time and money; use Abrams Aerial Surveys to show you the shortest practical routes for your pipelines.

For complete information send for your copy of "Pipeline Planning from the Bird's-Eye View," and the brochure "Aerial Surveys and Maps from Photographs."

ABRAMS AERIAL SURVEY CORPORATION
LANSING 1, MICHIGAN, U.S.A.

Mill Rejects Pass Tests

Additional Trials in the Field Show Defects Negligible Factors in Causing Drill Pipe Failures

Part 1

By H. G. TEXTER

Chief Field Engineer, Spang-Chalfant Division
The National Supply Company, Tulsa

FURTHER and more positive evidence that ordinary mill defects are negligible factors in causing drill pipe failures has been developed through additional and more extensive field tests made during 1949 and 1950 with two strings of mill rejected drill pipe.

Earlier tests, made in 1947 and 1948, seemed to indicate fairly well that usual mill defects had little appreciable effect on field failures. Consequently, the new tests were made to further study the problem and especially for the purpose of learning what sort or what depth of defects really would cause failures. It is significant that only four and possibly five failures which could be definitely traced to mill defects were in tubes with very bad inside defects, although 283 defective tubes were used in the tests.

Earlier Field Test Results

Results of earlier field tests were presented during 1948 in an API paper entitled "Field Test on Rejected Drill Pipe" by A. W. Thompson and the writer. The purpose was to learn whether the usual type of mill defects had any appreciable effect on the service life of drill pipe.

Thompson's company, Thompson-Carr, Inc., conducted the experiments, in West Texas wells, where corrosive salt water conditions greatly aggravated the frequency of drill pipe failures. In fact, they were once so frequent that contractors felt very certain the pipe must in some way be at fault.

The test was conducted through 1947-48, using 183 lengths (5300 feet) of 4½-inch O.D. pipe, all of which had been rejected at a pipe mill for various defects, principally outside and inside seams and pits. Some of the defects were actually twice the depth permitted by the API specifications and all were of a nature heretofore considered as utterly unfit for field service.

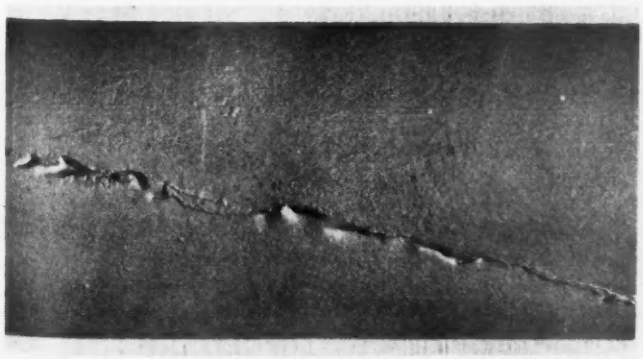
Over a period of 14 months this string was used to drill 20 "salt string" holes (11 and 12½ inches) to an average depth of 2323 feet, during which time 21 pipe failures occurred. The failures were either complete fractures (Figure 11), resulting in fishing jobs, or washed out cracks (Figure 10) which were caught before parting.

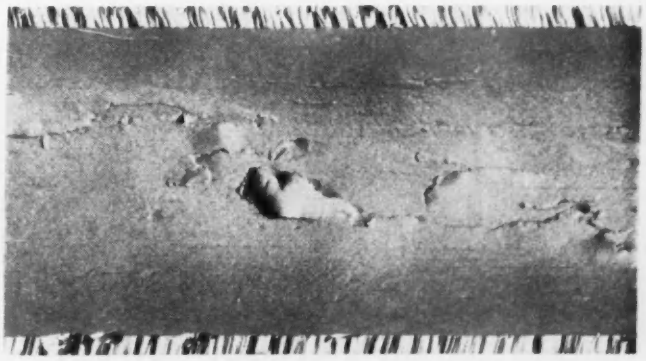
Examination of each failure showed that not one had occurred in a mill defect. Each tube had been numbered and the position of the defect had been measured from the box end so that there was no doubt as to the relative position of the falures and the defects. *All failures were the result of corrosion fatigue.* The closest location of a defect to a failure point was in Length No. 157 in which an outside seam extended to within one foot from a complete fracture.

So, it seemed fairly well established that the ordinary, visible types of mill defects had no appreciable effect on the incidence of field failures. However, as was stated in our conclusions,[1] "There must, of course, be some limit as to the depth or shape or direction of mill defects beyond which we dare not go." Also, as pointed out by one of the discussers of the paper, corrosion was such a large factor that the time element might have been too short for the defects to exert their normal effect.

Selection of New Test Strings

To further study the problem, and particularly to learn just what sort or what depth of defects really would result in failures, two new strings of





FIGURES 1 and 2. Extremely bad inside seams similar to many included in the two test strings.

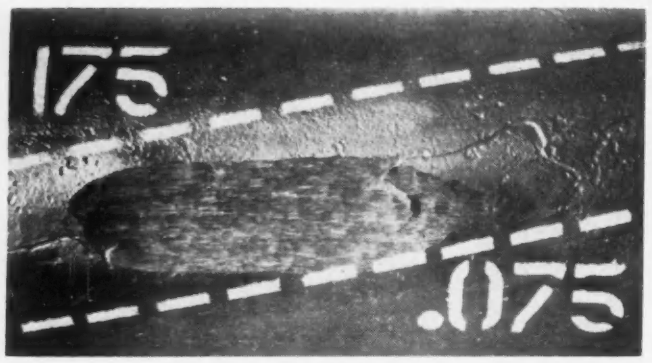


FIGURE 3.

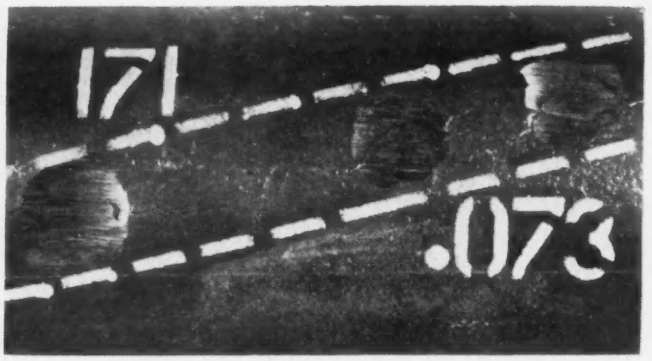


FIGURE 4.

Types of outside seams included in the two test strings.

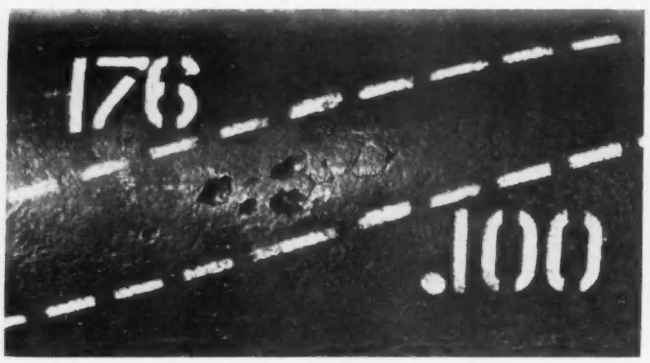


FIGURE 5.

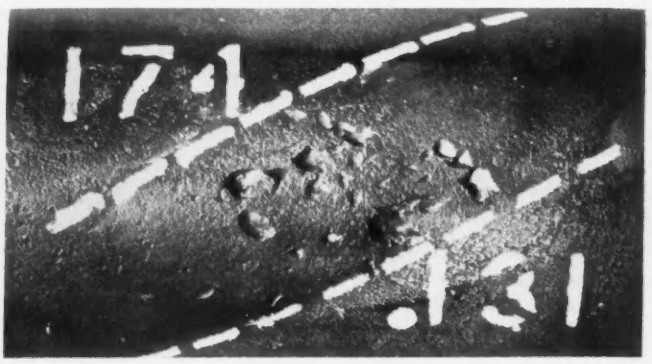


FIGURE 6.

Examples of outside seams included in the two test strings.

mill rejects were selected. Thompson, who had run the first string, elected to run one of the new strings and Stanolind Oil and Gas Company's drilling department accepted the second one. These trials were carried on during 1949 and 1950.

As before, the size was 4½-inch O.D. x 16.60 pounds, Range 2, mixed Grades D and E, just as they happened to be found by the inspectors. The inspectors had no idea that they were selecting pipe for field tests; so there could be no prejudice. Their daily rejects were simply laid aside instead of going to the scrap yard.

The principal difference between these second and third lots of rejects and the first lot, described in the API paper, is that the degree of defectiveness was much greater. In fact, many of the defects were so deep and so "horrible" looking that the plant superintendent almost refused to let them be shipped The argument that we specifically wanted some failures to occur in defects is all that finally won him over.

As in the original string, all tubes were carefully steel-stencil numbered and the description of the defects recorded. Their position was measured from the box end so that if a defect were lost in a well its relation to the failure point could still be established.

Identifying slots were milled in the tool joints to segregate the test lengths from others. Finally, before leaving the mill, each length was tested to 5000 pounds per square inch internal water pressure, this being the only procedure differing from the treatment of regular drill pipe-tool joint product.

The lot of mill rejects destined for Thompson-Carr consisted of 84 lengths (2500 feet). By chance 54 happened to be Grade D and 30 Grade E. To study the relative resistance to corrosion fatigue 41 lengths were internally shot blasted and shot peened and 43 were shot blasted and coated with a phenol-formaldehyde thermal setting palstic.

The Stanolind string consisted of 200 lengths (5800 feet). There were 64 of Grade D and 136 of Grade E. Again there were different treatments of the internal surface: 60 were untreated, i.e., with the original mill scale; 75 were shot blasted and shot peened; and 59 were shot blasted and plastic coated.

In the original experiment none of the lengths were internally treated, thus presenting the best possible surface conditions for aggravating internal corrosion fatigue. Also, further to hasten the occurrence of failures, Thompson deliberately used a minimum of drill collars and thereby increased the magnitude of the bending stresses. Thus it was that we were accused of having so hastened the occurrence of corrosion fatigue failures that the defects themselves had no chance to operate.

For the second and third experimental strings every effort was made to prolong the life of the pipe by using adequate drill collar weight (to keep the pipe in tension) and by shot peening and plastic coating most of the lengths. Thus, it is hoped, we will have disproved that rate of failure has any tendency to nullify the effect of mill defects. Furthermore, these steps reduced the very real financial hazard incurrd in operating drill pipe strings, every length of which contained defects that no mill or outside inspector would ever consider passing and which no driller or toolpusher could even hear about without a shudder.

Mill Inspection of Defects

Before shipping from the mill a great many photographs were taken of (so-called) typical injurious defects. Good photographs of inside defects are hard to obtain; so none were made. However, to illustrate some of the extremely bad inside seams (often called "overlaps") several tubes were cut open as shown in Figures 1 and 2. Of course, these defects could not then be put into service, but many other inside seams even much worse than these were actually run, as can be seen in Figures 10 and 11, of defects that had resulted in failures. In fact, very bad inside

seams were the predominant defects in both the Thompson-Carr and the Stanolind strings.

Figures 3 and 4 illustrate types of outside seams in pipe shipped. The upper painted numbers are the tube number and the lower ones denote the defect depth. The seams are ground to find their true depth and API drill pipe is discarded if the depth is more than .042-inch (12½ percent of .337-inch, nominal wall thickness of 4½-inch, 16.60 pound drill pipe).

Figures 5 and 6 are examples of outside pits. Note that for tube No. 176 the depth of the deepest pit is over twice the API allowable and for tube No. 174 the depth is almost three times the allowable. It is interesting to note that neither of these two tubes failed in service.

Thompson-Carr Field Tests

The Thompson-Carr string (84 lengths) drilled in 24 wells, a total footage of 66,634 feet with total rotating hours of 3071. All this was in the Permian Basin of Texas and New Mexico, in which corrosion fatigue is very prevalent.

The holes drilled were the "salt string" holes, mostly 11 inches and 12¼ inches for setting 8⅝-inch and 9⅝-inch O.D. casing. They ranged from 519 feet in depth to 3860 feet, the deeper wells requiring additional drill pipe which was not part of the defective lot.

During this period 14 failures occurred, either washed out cracks or complete failures—eight of which were returned to the mill for study. Of the total, 11 were Grade D pipe and three Grade E, which may or may not be of significance. Only two failures (not corrosion fatigue) were in plastic coated pipe and 12 were in shot blasted and shot peened pipe. This may be significant since there was only one corrosion fatigue failure which occurred in uncoated pipe.

Besides the eight failures which were sent back to the mill for study, there were six which were apparently cut up or otherwise discarded before they could be analyzed. Those familiar with drilling practice will readily understand how such mistakes can happen. Keeping a test engineer constantly at a rig defeats the chance of handling the test lengths in a truly unbiased manner.

The first failure in the Thompson-Carr string occurred at 20,570 feet of hole (1169 rotating hours), the second occurred about the same time, and the third at 31,200 feet. All three occurred about 2½ feet from the box, which puts them in the slip area. Since it was known that mill defects were not at fault, and since there was no evidence of corrosion fatigue, it may be inferred that the failures were due to notch fatigue induced by, or aggravated by, slip marks. Figure 7 is a view of the first failure and is illustrative of the first three.

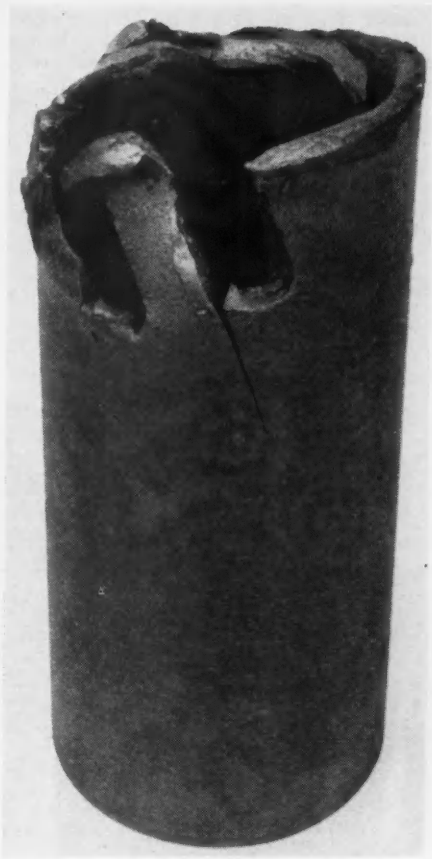


FIGURE 7. First Thompson-Carr failure, apparently due to notch fatigue induced by, or aggravated by, slip marks.

The test for corrosion fatigue, incidentally, is to cut strips from the pipe, as in Figure 8, and bend them backward in a vise so that the elongated inside surface may be examined. If unattacked, the surface will be unbroken, as in the lower three specimens. If there has been even a slight amount of corrosion fatigue there will be from a few to very numerous transverse cracks, as in the upper two backward bend tests.

Figure 9 is a typical example of a failure, a washed-out crack, due specifically to corrosion fatigue. This was tube No. 251, Grade E, which failed after drilling 51,360 feet of hole (2431 rotating hours). Its mill defect was an internal seam running from the box end upset for a distance of twelve feet. The failure occurred at

About the Author

H. G. TEXTER, chief field engineer for the Spang-Chalfant Division of The National Supply Company, was graduated from the Carnegie Institute of Technology in 1913 with the BS degree in chemical engineering. Following graduation, he joined National Tube Company. In 1923 he joined Spang-Chalfant. A pioneer in tubular goods engineering, Texter has been connected with many API and other association studies of the subject matter.

FIGURE 8. Tests for corrosion fatigue, in which strips cut from the pipe are bent backwards for examination.

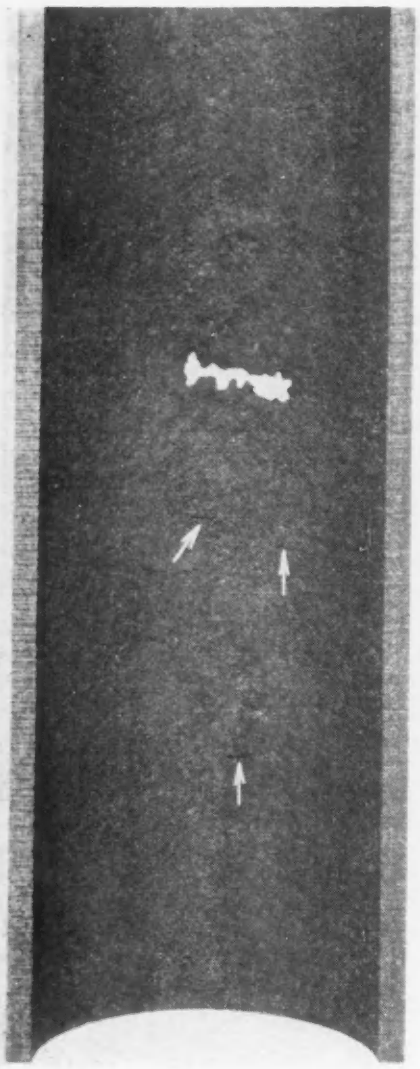


FIGURE 9. A typical example of a failure, a washed-out crack, due specifically to corrosion fatigue. Arrows indicate additional cracks.

FIGURE 10. First failure in Thompson-Carr string definitely traced to mill defect. Failure occurred because of very bad internal seam.

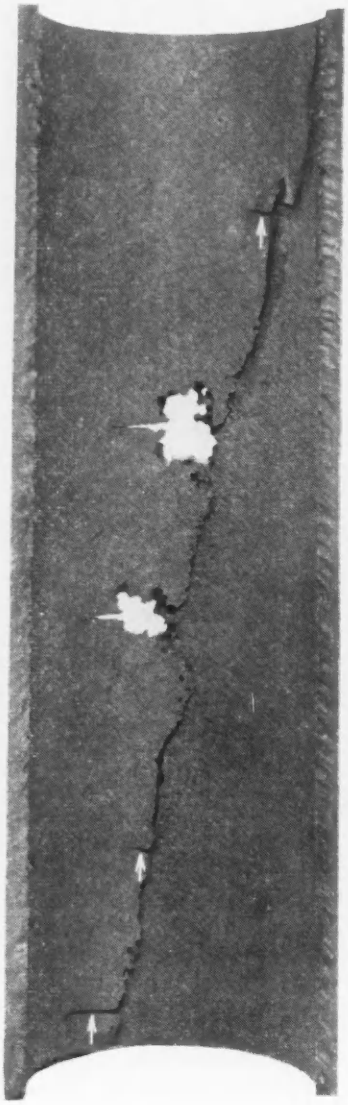


FIGURE 11. Another example of a failure in Thompson-Carr string due to rejectable inside seam.

16 feet 8 inches from the box and therefore had no connection with the defect. The tube had been shot blasted and shot peened, but was not internally coated. Arrows in the photograph indicate additional cracks on the inside surface.

Figure 10 is a photograph of the first failure which definitely originated in a mill defect. This was tube No. 209, Grade D, shot blasted and shot peened only, in which there was a very bad internal seam running the full length. It is an example of one of the tubes which was shipped *only* because we wanted to include a defect that would very likely cause failure. *It did.*

The seam was of the very scabby type, the thin edge of which is curled up into the inside of a tube to such an extent that it would not have passed a drift plug. (Drifting, however, is not required by the API specifications for the body of drill pipe). It could be seen by a very casual glance into the inside and would never be passed by anyone short of a blind man.

Apparently corrosion of the very thin outer edge, sticking up into the mud flow, had induced transverse cracks which, in two places, progressed through the wall of the pipe and were then washed into rounded holes by escaping mud. This, then, is a type of mill defect that very definitely can result in field failure, at least in corrosive mud areas. It is the writer's firm opinion, slightly prejudiced possibly, that the defect would not have resulted in failure in non-corrosive territory.

It is of interest that this first failure in a defect did not occur until the string had drilled some 50,000 feet of hole. Since the whole string was retired at 66,634 feet the defect, in spite of being extreme, reduced the life of the tube only 25 percent.

Figure 11 illustrates the only other example, in the Thompson-Carr string, of a failure induced by a mill defect. It is quite similar to the tube in Figure 10 as to type of defect and mode of failure. This was tube No. 225, Grade D, shot blasted and shot peened. It failed in the twenty-fourth or very last well, just before the string was discarded, and is therefore credited with 66,634 feet of hole (3071 hours). It appears that most of the paper thin edge of the upturned seam had corroded away and the tube almost escaped developing a crack entirely through the wall. If so this would account for there not having been literally dozens of failures of this type since both the Thompson-Carr and the Stanolind strings contained more rejectable inside seams than any other type of defect.

REFERENCE

1 "Field Tests on Rejected Drill Pipe," API paper, 1948, Thompson and Texter.

(First of two parts)

Wilson

. . . STANDS ALONE!

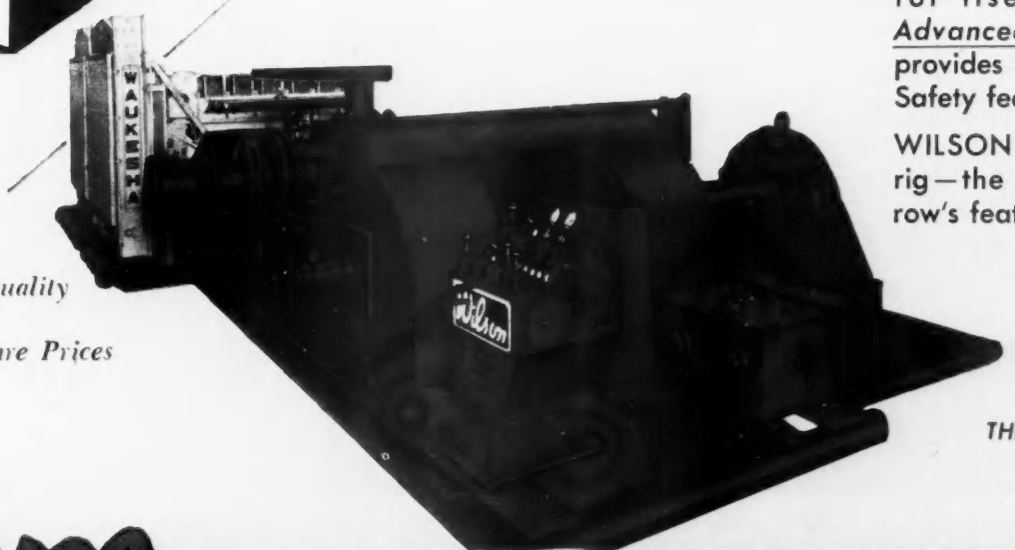
WILSON *Advanced Engineering* — above all else — has kept Wilson the Leader in the Industry.

WILSON *Advanced Engineering* makes it possible for the Contractor to make money in times of high labor and operating costs. WILSON *Advanced Engineering* allows the Contractor to make money many years after the rig has paid for itself. WILSON *Advanced Engineering* provides the maximum in Safety features.

WILSON is the Driller's rig — the rig with tomorrow's features — TODAY!

Compare Quality

Compare Prices



THE NEW WILSON ATLAS RIG

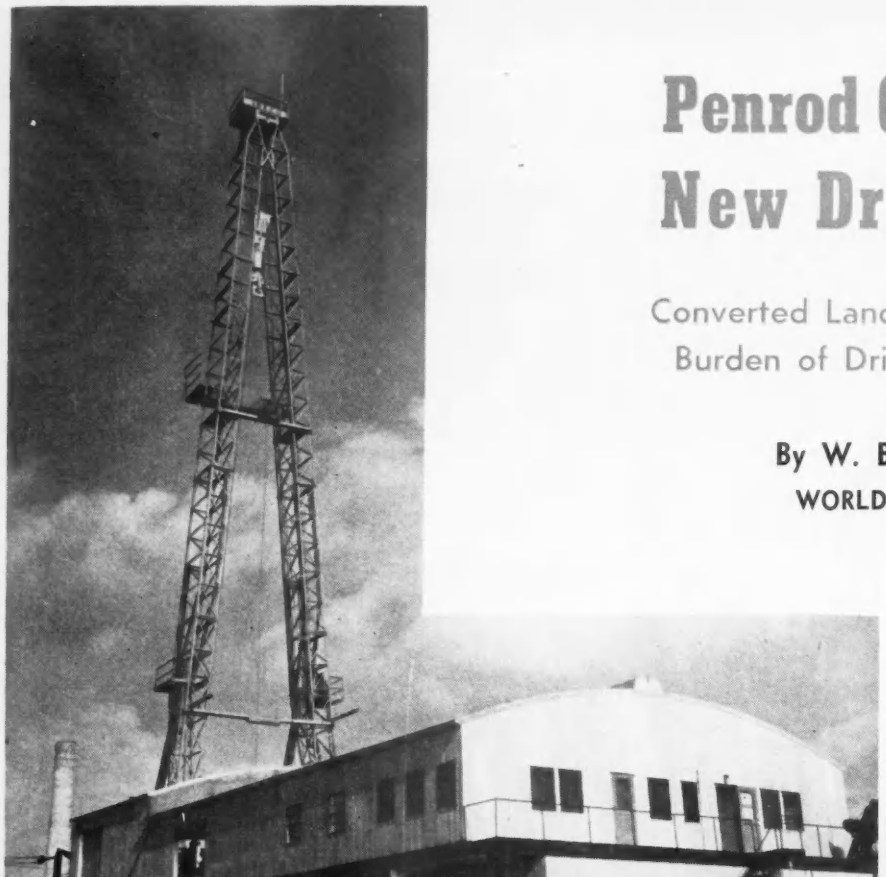
Wilson MANUFACTURING CO., Inc.

WICHITA FALLS TEXAS

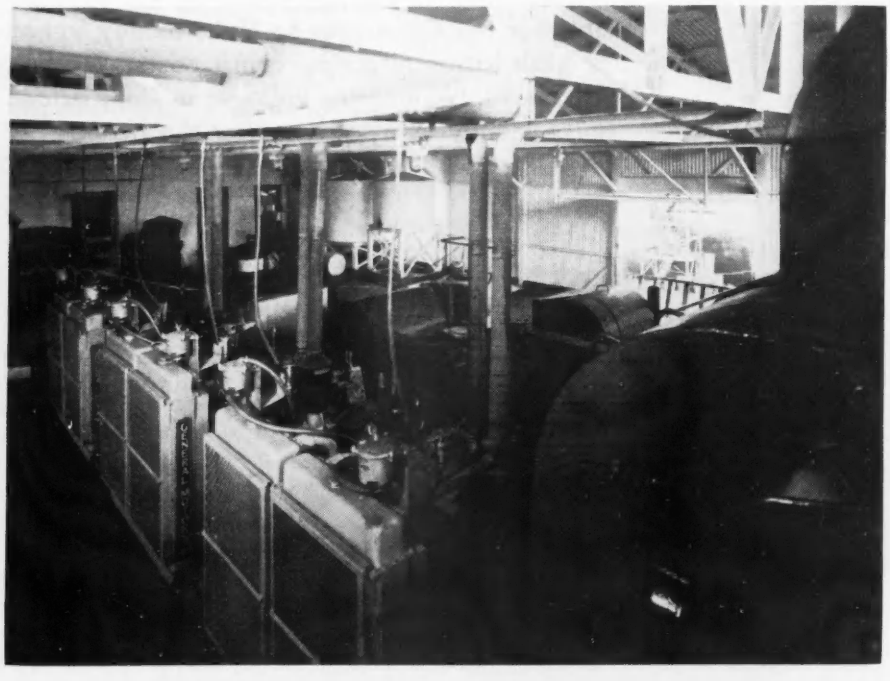
Penrod Completes New Drill Barge

Converted Land-Bound Rig Eases Burden of Drilling Contractors

By W. B. COLVIN
WORLD OIL Staff



This view of new drill barge shows mast in operating position. Living quarters, power plant, generators and blow-out controls are on upper deck aft.



Adequate, well ventilated space is provided for the rig power plant, compound and auxiliary equipment. The engine room can be completely shut off by overhead doors during bad weather.

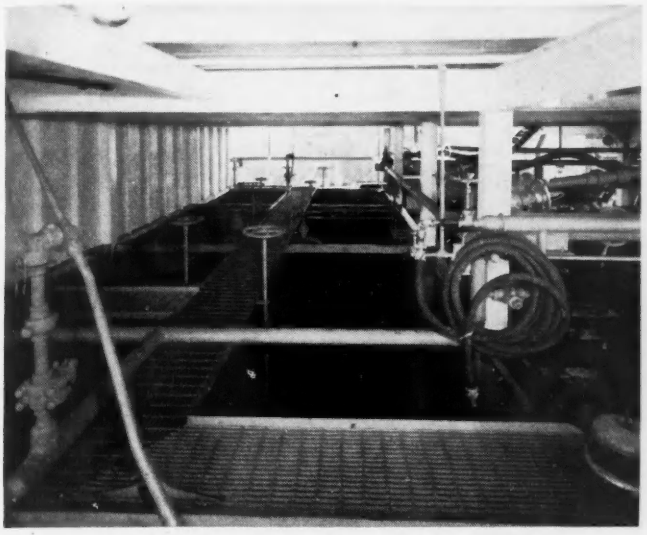
GULF Coast operators, in their scramble for marine drill barges, have available another compact unit recently launched by Penrod Drilling Company. Greater demand for this type of equipment prompted Penrod to build a unique barge which houses a rig formerly land-bound. Conversion from land to marine tools was carried out in record time. The rig features every detail of flexibility and efficiency.

Feather Balance

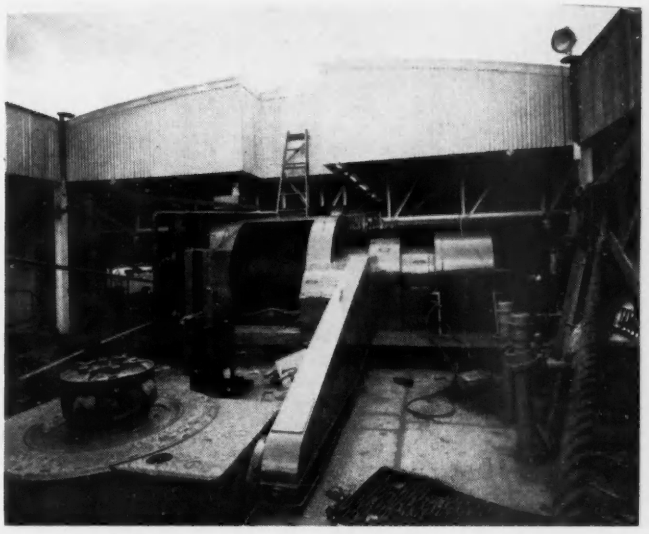
The 180 x 52 x 12 foot drill barge was skilfully engineered to permit feather balance with the mast either erect or horizontal. An example of this feature is demonstrated by the fact that with all tanks empty, 400 joints of drill pipe on the rack and the derrick vertical, draft of the slot-end is four feet, four inches while the dimension of the slot-end is three feet, five inches. Under the same conditions, except with the derrick down, the slot-end draft is four feet, ten inches and the solid-end draft is two feet, 11 inches. In short, change of the draft factor is limited to just six inches, a true accomplishment in balancing extra heavy marine equipment. Aside from erasing barge swamping dangers, this balance feature permits ease in towing and smooth entry into shallow dredgings since the unit is maneuvered with the solid end forward.

10,000-Foot Rig

The power plant and drawworks on the Penrod rig will permit completing operations to, or below, the 10,000-foot mark. Pumping facilities include two, 18-inch pumps and one 15-inch pump rigged to permit speedy



Catwalks surround mud storage tanks permitting easy access to control valves. Each vessel is equipped with submarine agitators to assure proper blending of additives.



Here's a view of the derrick floor at the slot end of the drill barge. Capable of drilling below 10,000 feet, the barge offers latest in equipment and design.

and flexible operation. Both 18-inch pumps, stationed on the intermediate deck, are driven by vertical belts attached to the compound one deck above. This plan saves space and still permits uninterrupted operation of mud circulating units.

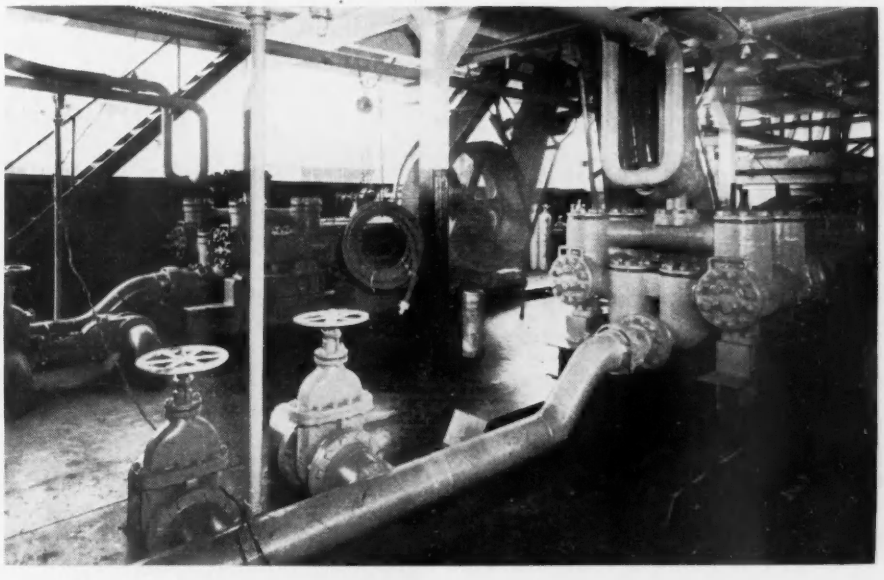
All pump suctions are supercharged by the fluid head maintained in the two, 15 x 36 x 6-foot active mud tanks. Catwalks permit easy access to all control valves and the tank agitating system. Line vibration is reduced to a minimum with rotary hose segments spliced throughout the line layout pattern.

Racks and Quarters

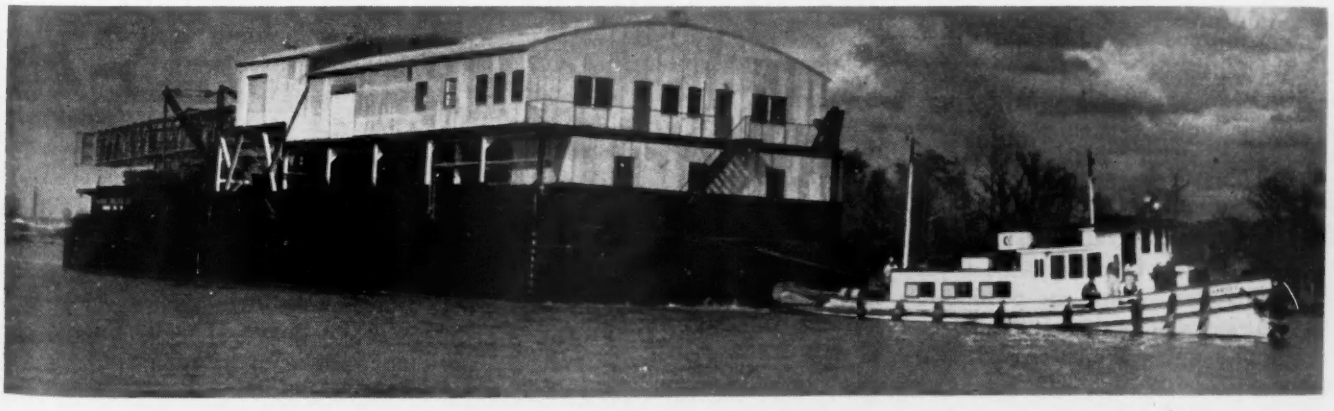
Simple, yet effective boom installations permit rapid drill pipe and casing movement from the racks to the derrick floor.

Living quarters are complete with a neat, well-equipped galley. Nothing has been overlooked in providing conveniences for the crew members.

Designed for marsh operating, the Penrod drilling barge is complete in every detail. The industry has available another well-rigged, efficient drilling barge.



Mud circulating facilities include two 18-inch pumps with one 15-inch standby unit. Vertical belt drives permit efficient operation and conserve valuable deck space.



Here the Penrod barge is towed from the Levingston Shipbuilding Company yard. Feather balance results in only six-inch draft change when the derrick is shifted. With mast down, forward end of barge lifts six inches to permit easier towing and access into shallow canals.

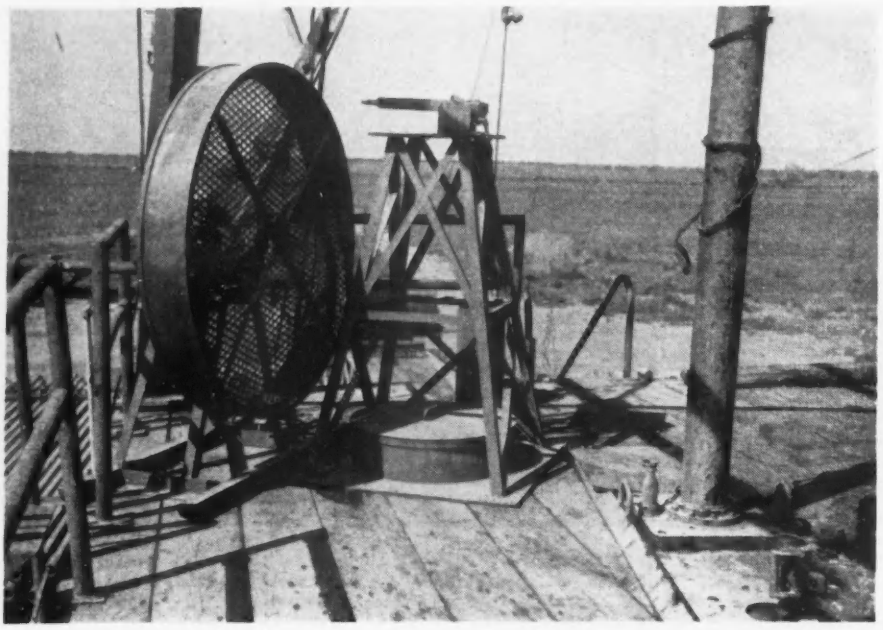
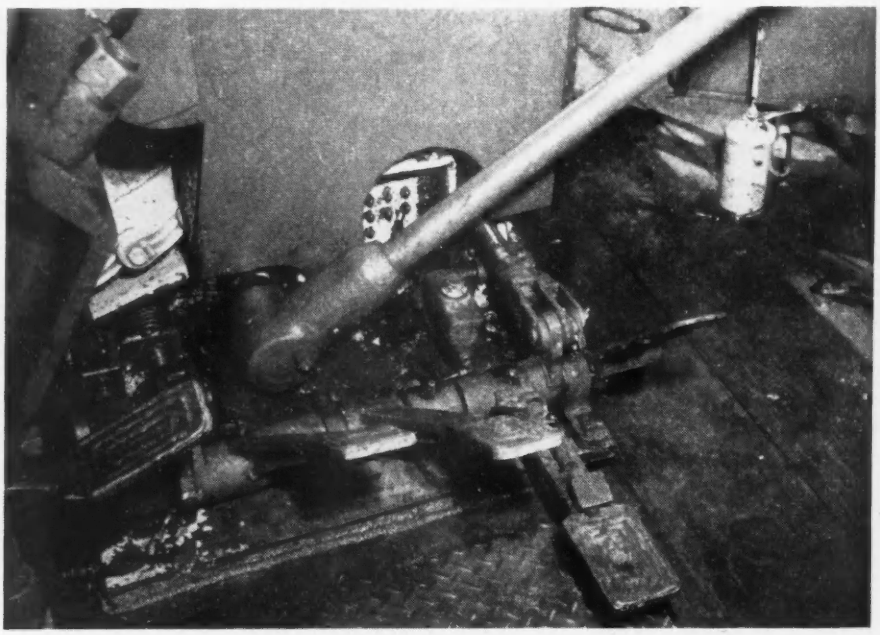


FIGURE 1 (left). This rugged control unit is made of welded one-inch angle iron securely braced and anchored to a quarter-inch base and deck plate. The strap metal control arm starts the hydraulic pump resting on the support deck. Control hose for entire system is coiled in covered case welded to base plate. The operating position of the control stand is governed by the operation in progress.

FIGURE 2 (below). The hydraulic booster unit, resting under the brake lever, is coupled to the system with copper tubing. Control hose junctioning the stand and booster is anchored under floor. In each instance, standard truck hydraulic brake system parts are used.

Remote Cathead Control Safe And Convenient



THE operation of running casing or picking up drill pipe will become safer and faster if a remote control system is connected to the cathead spooling the derrick line. The illustrated system, which was developed by L. A. Sherman, drilling tool foreman, Magnolia Petroleum Company, uses standard truck hydraulic brake system parts and angle iron salvaged from junked equipment. In operation, the control stand is placed near the pipe ramp so that the operator can see all operations on the floor and at rack level. With this plan in use, the possibility of accidents will be reduced and the job of picking up tubular goods will be expedited.

Figure 1 illustrates the manner in which the control stand is made of angle iron, one-quarter inch metal plate and a hose storage compartment welded atop the unit base. Movement of the control handle actuates the hydraulic booster pump resting on the deck plate.

The second step involves anchoring a hydraulic booster unit under the brake lever. Copper tubing connects the incoming hose from the control stand and extends to the break-out cathead on the brake side of the drawworks. The installation in question involves a hydraulically-controlled cathead; however, a similar plan can be utilized in air operated catheads.

In operation, movement of the remote control lever starts the hydraulic pump which relays this force through the rubber hose, booster element and ultimately to the break-out cathead. Response to the hydraulic control lever is gauged to split-second timing.

Cost of the unit primarily involves labor, except for the hydraulic pump and booster, since all other parts have been salvaged from discarded equipment. It is estimated that the cost of the complete system is well below $100 and, with the introduction of more convenient working conditions, rapid pay out is possible since valuable rig time will be saved when tailing-in singles of drill pipe or casing. More important, of course, is the creation of safer working conditions on both the rig floor and in pipe rack area

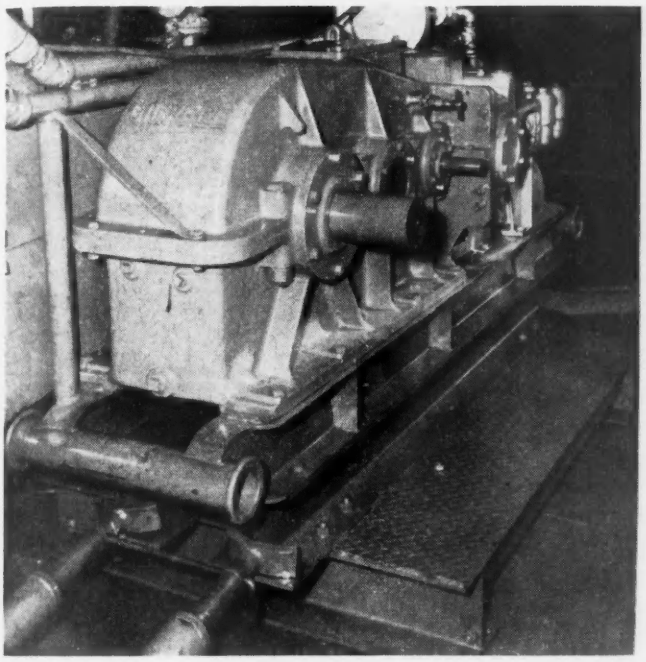


FIGURE 1. The two master control lines are anchored permanently to the automatic driller skid base. Uncoupling the two junction hoses is only requirement for rig moves.

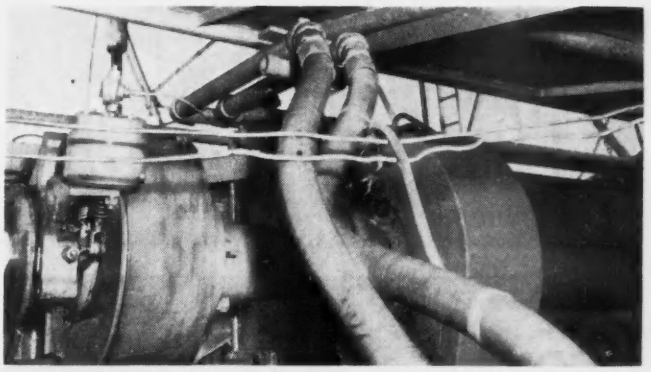


FIGURE 2. Junction hose eliminates possible transmission of vibration between drawworks and driller unit.

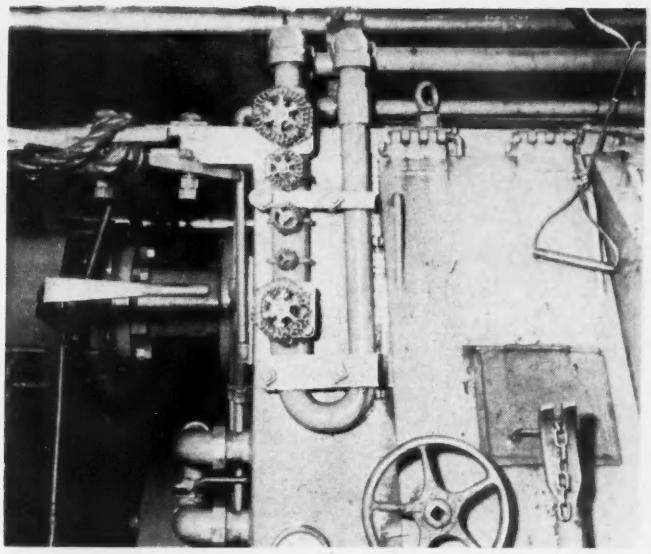


FIGURE 3. Clamps are made of strap metal and bolts and anchor control lines to drawworks case. The control system becomes permanent part of drawworks case.

Simplified Rigup With Permanent Driller Lines

THE domestic manufacturer makes the finest drilling equipment in the world available to the contractor; however, complete, on-the-job performance efficiency is left pretty much up to the discretion of the operator. Of course, each manufacturer and supplier is represented by rigup specialists who assist the operator in the final equipment assembly but his authority is limited specifically to recommending. Not only the automatic driller but all other component parts of a rig should be assembled to facilitate quick rigup practice plus greatest operational efficiency.

An example of efficient rigup practice is demonstrated by the unitized lines attached to the illustrated automatic driller. Rigged in a manner whereby uncoupling two hose sections is the only prerequisite to moving, the pipe layout is securely anchored to prohibit movement or damage created by vibration.

First stages of the installation include supporting the two master lines attached to the automatic driller. Figure 1 shows how the lower, two-inch line rests upon a 2-inch pipe pedestal welded to the driller skid base. Further support for the pedestal is assured by a ¼ x 1-inch diagonal brace extending from one of the unit case bolts and welded to the vertical support. A light bead of welding metal underlies the lower pipe for proper anchorage; however, the metal is built-up to minimum thickness to permit rapid removal for repairs. Two bead saddles, sided with short segments of ¼-inch rod, provide a rest for the top control line. A light deposit of welding metal secures the topmost line in place.

Two 45-degree fittings, rigged with all-thread nipples, are made up on the drawworks end of the control lines. The 2-inch all-thread nipples accept the hose couplings.

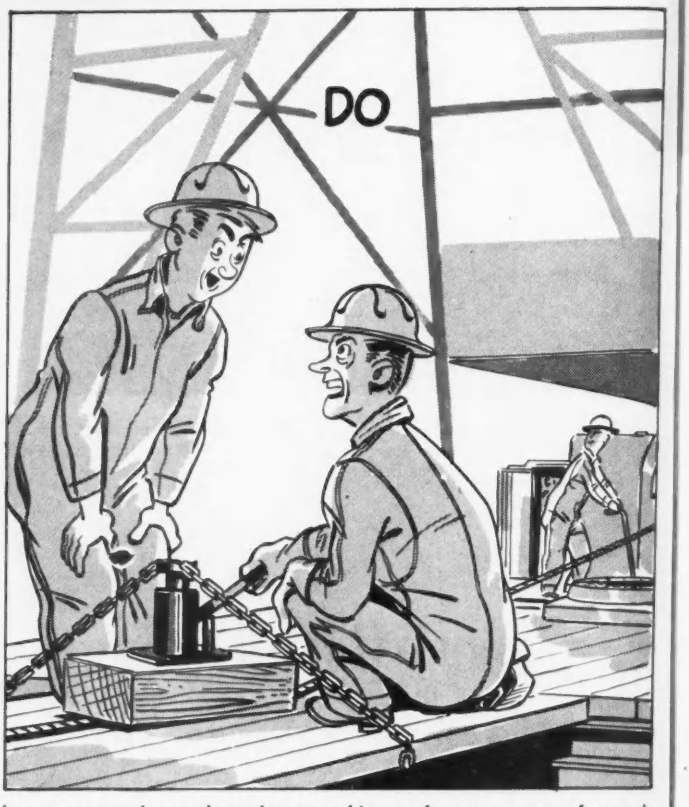
Use of the two hose segments between the drawworks and the automatic driller virtually eliminates transmission of vibration between these two operating units. Figure 2 shows how the hose segments join 2-inch pipe leads anchored to the drawworks case.

The union end of the two master leads are supported by a 2-inch, welded and formed "T" stand fitted atop the drawworks bearing journal. The two lead nipples are cut to a length permitting a 90 degree turn above the case drum opening. At this point, ¼-inch metal saddles are welded to the drawworks case at the outer limits of the two control nipples. Strap metal, bolt retained clamps anchor the two control lines in the desired position. This same type clamp (Figure 3) is employed for anchoring the valve control manifold to the drawworks control position.

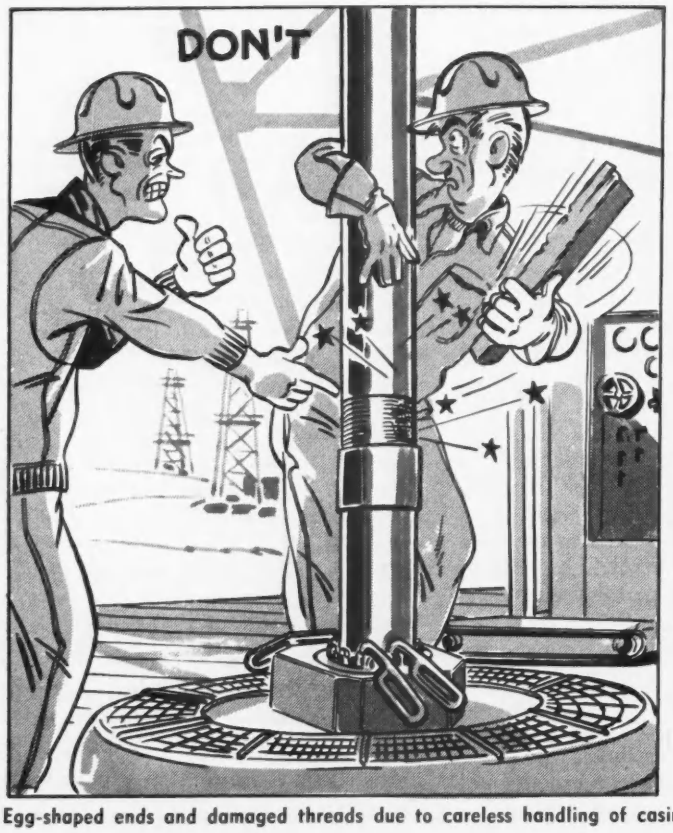
Rugged, efficient and easily installed, this control piping layout reduces rigup and tear-down time.

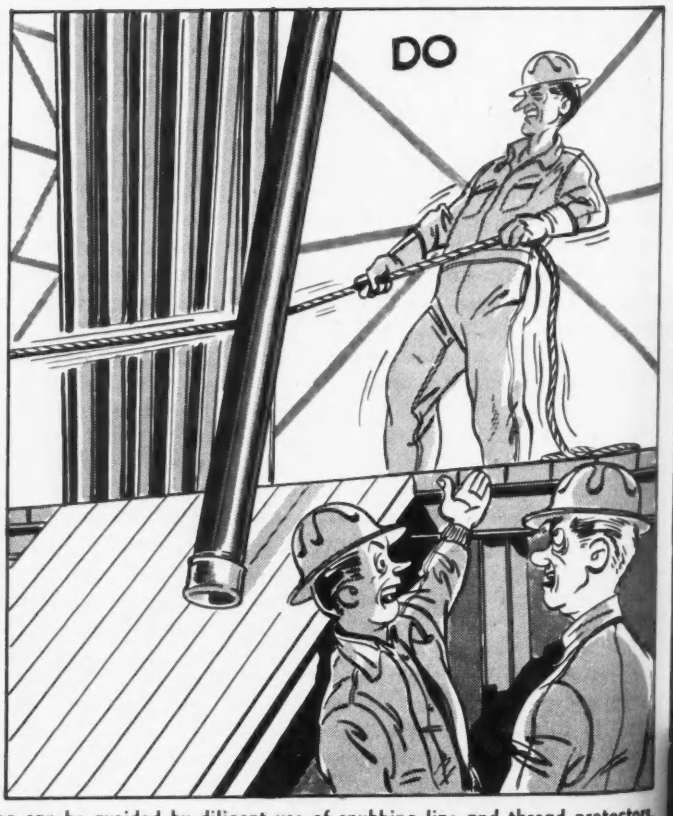
World Oil Graphics

WIRE LINE and CASING CARE



Snubbing and winding rope on drum carefully will reduce chances of wire rope swarming and resultant mashing and uneven wear of strands.

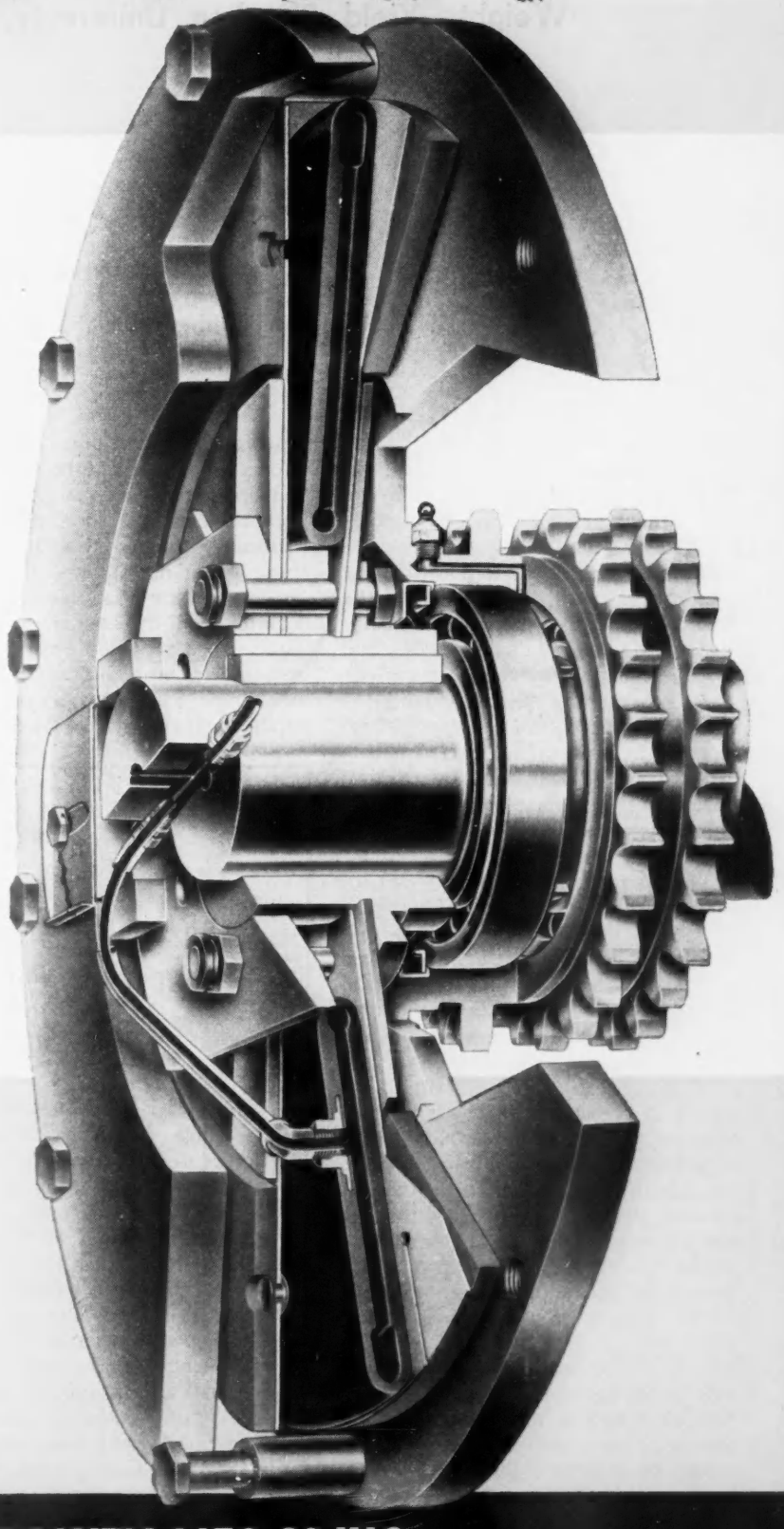




Egg-shaped ends and damaged threads due to careless handling of casing can be avoided by diligent use of snubbing line and thread protectors.

trouble in high speed friction clutches is

TEETH!



Our research on clutches has proved that when a clutch is engaged to pick up a load, the friction plates will not wear appreciably if:

(1) Materials of quality are used;

(2) Capacity of clutch is sufficient to avoid extended periods of slip.

Incomplete engagement or incomplete release of clutch plates are usually the real reasons for trouble with friction clutches. Both conditions are traceable to foreign material lodged in the gear teeth of gear-type clutches, or to improper adjustment when clutches are designed to be adjusted manually.

The Cardwell "Flex-Disc" air friction clutch has NO GEAR TEETH; requires no adjustment; cannot slip under load and cannot drag when disengaged.

CARDWELL

REG. U. S. TRADE MARK PAT. OFFICE

THIS TRADE MARK INSURES HIGHEST QUALITY AT LOWEST PRICE

CARDWELL MFG. CO. INC.

P. O. Drawer 2001 . . . Long Distance Telephones 128—129—130

Cable Address: "ALL STEEL," Wichita — "CARDSTEEL," New York

Wichita, Kansas, U. S. A.

TWENTY-FIVE YEARS CARDWELL SERVING THE OIL INDUSTRY

Minimizing Oil Well Cementing Failures

New Cement Additive Offers More Exacting Control of Slurry Weights, Yield, Bleeding, Uniformity, Setting Characteristics

By GEORGE B. MANGOLD

Research Department

Petroleum Engineering Associates, Inc., Pasadena, Calif.

PRELIMINARY laboratory and field data indicate that the application of a superior pozzolan in oil well cementing will provide immediate financial savings to the operator and may advance oil well cementing techniques to the point where the cement will be considered as a separate "string" which can be engineered to meet the conditions of temperature, pressure, drilling fluids, formation materials and other environmental factors. In this manner, completion time will be reduced, work-overs minimized, oil recovery increased, and durability and long-life of the completion job assured.

The petroleum industry has for years tried to overcome oil well cementing failures and in so doing has developed new and better mechanical devices. These devices have helped in securing adhesion of the cement to casing and formation and in placing the right amount of slurry at the desired height in the least time. Research in cementing methods has uncovered several valuable aids which expedite the process. More recently, the advantages of bentonite and expanded perlite, mixed with the cement slurry have been realized. Bentonite has the desirable property of increasing angle of repose, reducing slurry weight and improving flow characteristics. Expanded perlite greatly decreases slurry density and aids in the prevention of lost returns. Neither material, nor the mechanical devices, counteract some of the basic causes of cement failure such as the detrimental effects of high temperature and pressure, chemical combination of by-products of the cement-setting reaction and formation minerals and fluids, plus the harmful effects of many drilling muds.

More than two years ago a comprehensive study of the entire cementing problem was launched to thoroughly investigate the cement and cementing techniques used in a certain field by operators who had experienced repeated cement troubles and failures, and to develop a cement and a technique whereby the difficult problems inherent to this field might be overcome. Because of the geographical location and the depth of drilling, extremely high temperatures were common along with high pressures associated with deep drilling. Early in this investigation it became obvious that the cement as used did not function adequately under the peculiar and extreme conditions encountered. The obvious need for an improved cement in this and other fields prompted a broader program.

In order to counteract the basic causes of cement failures the problem was attacked from the standpoint of developing a material that could be intimately intermixed with cement for the express purpose of combatting the chemical and physical factors of environment such as pressure, temperature, drilling fluids, mud filtrates and cakes, formation fluids and formation minerals, as well as the actual physical condition of the formation. Some of these factors may be altered by other means, such as the selection and treatment of drilling fluids, the use of chemical washes and the methods of drilling. Such procedures may be advantageous from the cementing standpoint but may work to the disadvantage of speed of drilling, stability, of the formation and ultimate recovery of oil. Properties inherent to the formation cannot be changed. It would be necessary, in order to provide a perfect cement, to chemically and physically alter its properties so that it could meet all the conditions of the imposed environment—including the properties of the drilling fluid desired, to attain greater durability with better placing and setting characteristics, to regulate resultant cement properties so as to best serve

About the Author

GEORGE B. MANGOLD was graduated with B.S. and M.S. degrees in chemical engineering from the University of Southern California. For ten years, broken only by military service, he worked in the research laboratories of the Baroid Sales Division, National Lead Company, on various phases of drilling mud development. He worked a short time in Venezuela as a mud engineer prior to joining the Petroleum Engineering Associates, Inc. in Pasadena, Calif., to take charge of the laboratory devoted to drilling fluids, oil well cements and a variety of research problems.

the particular requirements of each job. In short, to "engineer" the cement job.

In the process of developing a material to permit a closer approach to this cement engineering, a thorough study was first made of the effects of the various factors already mentioned. Various types and brands of cements were tested at selected slurry weights, set and cured under bottom-hole conditions of temperature and pressure up to 360° F. and 8000 pounds per square inch, respectively, and exposed during setting to different types of muds and materials. Properties observed and measured included water requirement, slurry weight, bleeding, segregation, setting time, resultant strength, strength gain; hardness and brittleness. Yields and cost were analyzed. Identical series of tests were made in which various pozzolans, additives, and cement-replacement materials were used. One of these materials, an exceptionally reactive pozzolan of the diatomaceous earth type, was already known to have marked ability to chemically protect cement in construction work from reaction with active aggregates. Its superiority and potential value quickly became so obvious as to limit the study to a comprehensive evaluation of its properties and uses in various cements and in various environments.

This material, named Peacoide in the form used as a cement-replacement compound, was developed and evaluated over a two-year period, and has proved very beneficial in the laboratory for counteracting most environmental conditions which might lead to oil well cementing failures. Field use of the material has started in California and results have been most satisfactory. It is a light, dry, finely-ground inorganic solid, easily mixed with cement. It may generally be used as a replacement for up to 25 percent by weight of the cement, and in even greater proportions for particular applications.

LOW SLURRY WEIGHT. The frequently excessive density of neat

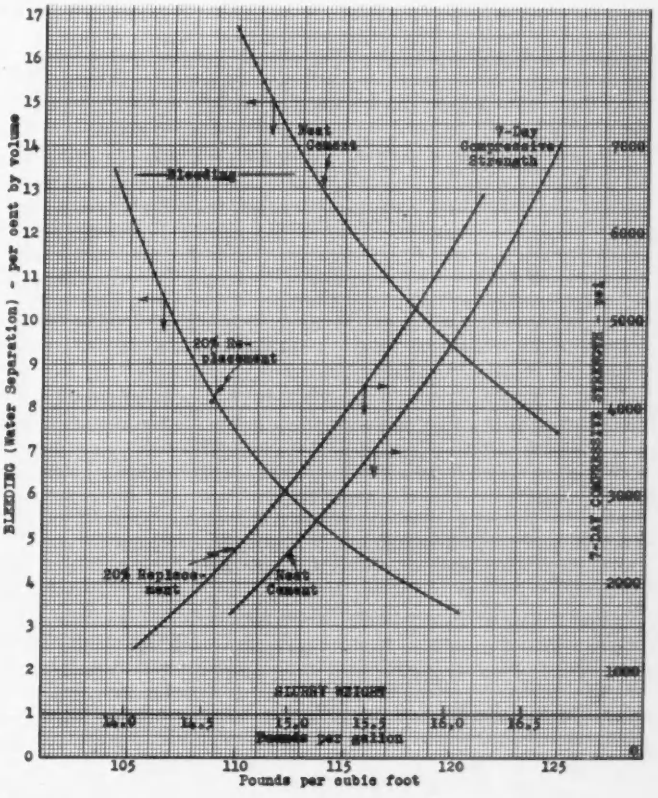


FIGURE 1 (right). Effect of slurry weight on compressive strength and bleeding of oil well cement. (Underwater curing at 80° F.)

FIGURE 2 (below, left). Effect of 20 percent replacement on compressive strength. (Cured under oil base mud at 300° F. and 5000 psi. Slurry weight = 110 lb/cu. ft. or 14.65 lb/gal.)

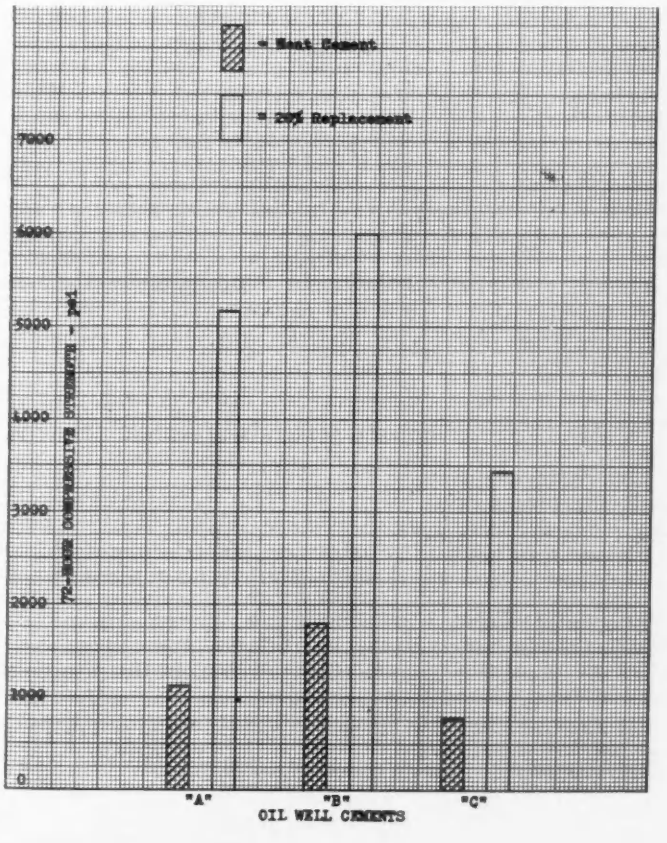
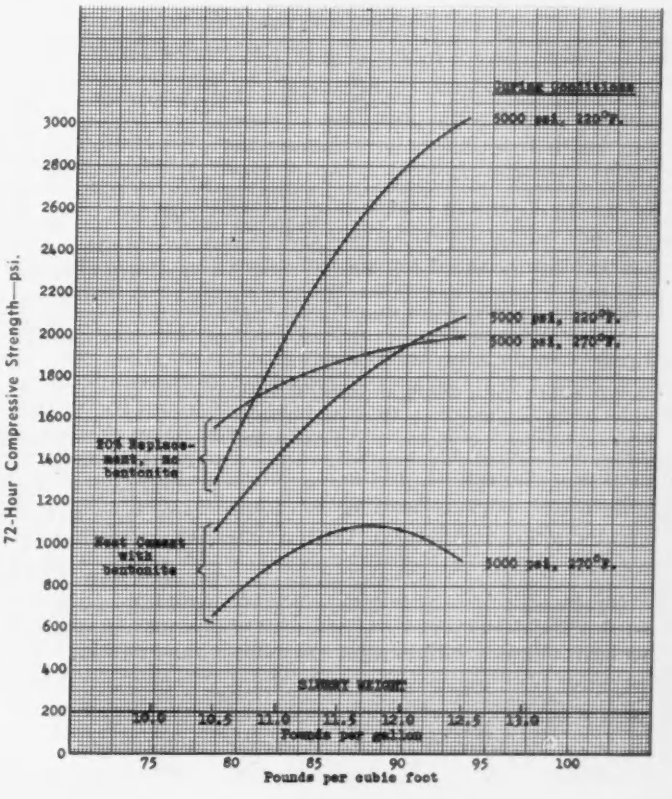


FIGURE 3 (below). Compressive strength of lightweight aggregate oil well cements. (Constant consistency.)



cement slurries (over 16 pounds per gallon or 120 pounds per cubic foot) is a potential lost circulation hazard that can be reduced by watering or by adding bentonite and/or lightweight expanded perlite aggregate. Watering-down vastly increases segregation and bleeding. The replacement material lowers slurry weight because of its own low density and because it requires additional water beyond that necessary in neat cement slurries, yet it has the unique ability to maintain excellent strength characteristics.

Greater Yield. The additional water requirement and greater volume of solids of the replaced-cement slurry results in greater yield, that is, greater volume of slurry per unit volume of cement or dry solids. For example, a neat cement slurry of proper consistency will yield in the neighborhood of 1.1 cubic feet per sack of cement. A 20 percent replaced slurry will yield 1.7 cubic feet per sack of cement or 1.35 cubic feet per 94 pounds of premixed pozzolan-cement, representing a yield increase of 22.7 percent. In other words, a given volume of slurry may be produced at a saving of 18.5 percent of the dry materials. Where more than 20 percent replacement may be effected, the savings would be even greater. In most oil-producing areas in California, this results in considerably decreased cost inasmuch as the price of the material is approximately that of the cement it replaces.

Controlled Workability. The particular type of formation or conditions encountered, or the desired type of job, often demand changes in slurry consistency with the possibility of serious harm from excessive thinning or thickening of an ordinary cement. Use of the replacement material in different percentages permits the desired workability without sacrifice of other beneficial properties.

Decreased Bleeding and Water Loss. Bleeding or water segregation is a serious fault of neat cement slurries, when watered to thin or lighten. This may cause poor water shutoffs, contamination of oil-producing zones, and water pockets leading to interconnection of formations. With a reasonable proportion of this pozzolan, replaced slurries minimize bleeding and water loss yet attain lower weights. Figure 1 illustrates the comparative bleeding, measured at atmospheric conditions, of neat cement and 20 percent replaced slurries at selected slurry weights. Tests at elevated temperatures and pressures showed susbtantially the same relationships.

Greater Uniformity. Bleeding and poorly-mixed additives cause segregation in the slurry and resultant variation of strength and other characteristics. Intimate mixture of the minute particles of this pozzolan promotes dispersion and separation and, together with reduction of bleeding, maintains uniformity of properties throughout the cement column.

Controlled Strength. Analysis of a great number of laboratory tests, covering a range of curing temperatures from 70-360° F. and curing pressures from atmospheric to 8000 pounds per square inch, showed that every cement has optimum curing conditions of temperature and pressure at which its greatest strength develops. It was discovered that the use of the replacement material usually results in increased strength at any given slurry weight when cured under temperature and pressure and attains a satisfactory strength at temperatures up to and over 300° F. These effects are shown graphically in Figures 1 and 2, the former indicating relationships of strength and slurry weight at 80° F., the latter showing the strength improvement afforded three of the most widely used oil well cements when set and cured under the normally unfavorable conditions of very high temperature and pressure and an oil-base mud environment.

In certain applications, strength may be of no concern and a very low slurry weight may be desired, as in the case of serious lost circulation that requires cementing. This may be achieved with a high percentage (75 to 85) of replacement, vastly increasing yield and reducing cost, and providing an extremely economical slurry for stopping extreme cases of lost circulation.

Still other applications may require medium strength and minimum shattering, as many operators desire for cement to be perforated. This may be attained by varying the replacement percentage well above the optimum for strength, as in the range of 30 to 40 percent. Thus, engineered replacement affords the means of achieving any desired strength under any conditions of temperature and pressure.

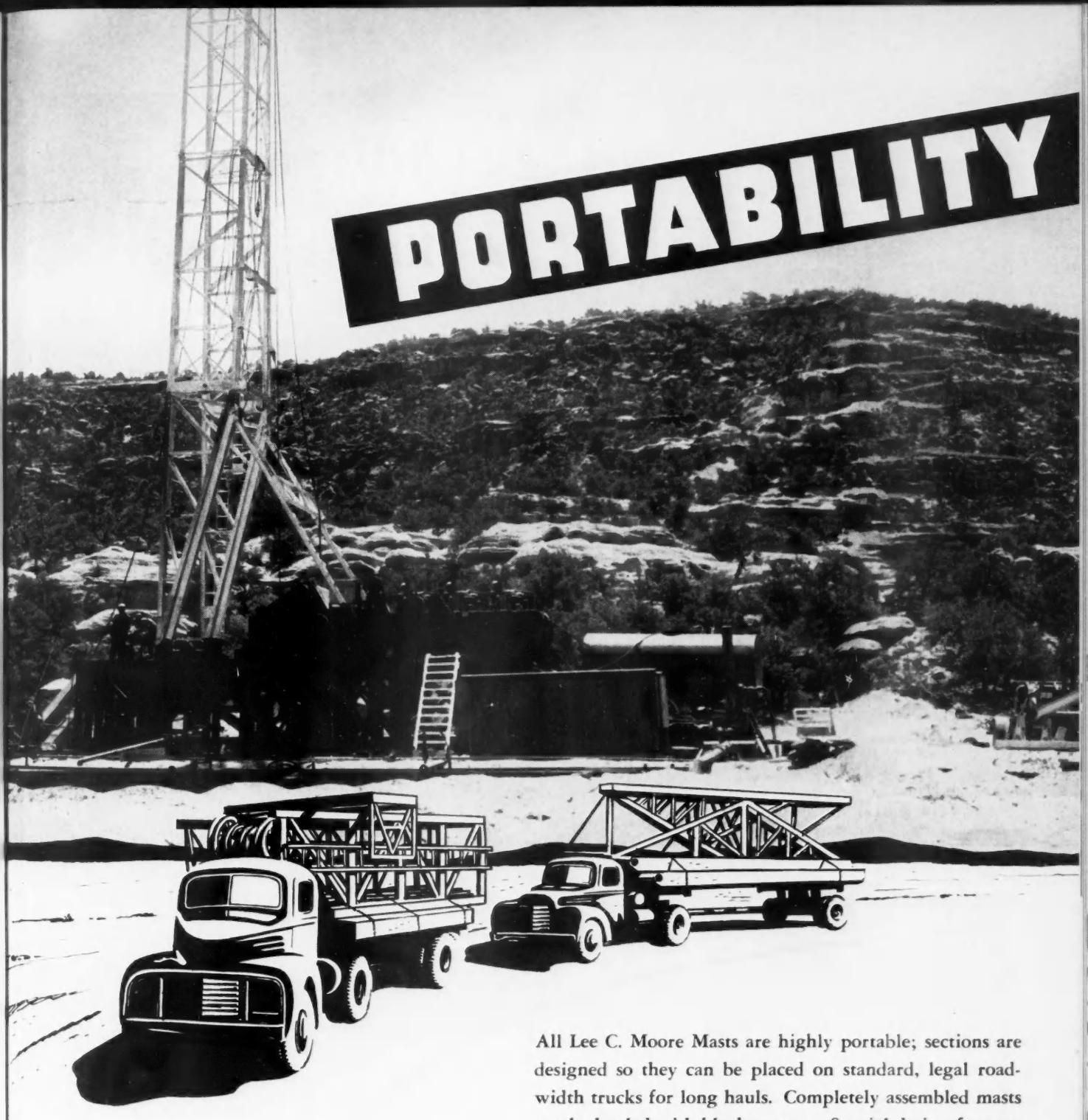
Formation Compatibility-Durability. In construction cement and concrete work, the effect of alkali-aggregate reaction has been given much study in the last 25 years. The slow combination of various siliceous aggregates and the alkalies liberated during the setting of cement causes expansion, strain and eventual disintegration. In many areas where aggregate is more reactive and where adequate precautionary measures of using a good pozzolan or special low-alkali cements were not taken, there is visible evidence of networked cracking throughout the concrete resulting from alkali-aggregate reaction. Some installations have crumbled to pieces in a few years or even months.

It may logically be assumed that this same expansive reaction (in this case between the siliceous formations and the liberated alkalies) is the cause of many supposedly successful oil well cement jobs that have failed months or years later and caused costly reworking. It might be argued that the use of scratchers and other mechanical or chemical devices to remove mud cake actually tend to increase the possibility of expansive reaction between set cement and siliceous formations. However, it has been proved in connection with construction concrete that the free ions will migrate slowly but for considerable distances even through set cement. There is no reason to believe that a relatively thin mud cake would stop this migration and therefore no reason to believe that the mud removing devices are not usually highly beneficial.

The replacement material minimizes or eliminates alkali-aggregate reaction by being able to combine with the alkalies while the cement is still in a plastic condition. This is possible because of its unique affinity for lime and alkalies and because of the inherent vast specific surface (fine grain size) of the material which greatly accelerates the reaction. Thus, it removes the ions that might otherwise cause serious post-setting expansion, and at the same time forms hard complex calcium silicates that actually contribute to the resultant strength. By removing leachable alaklies, the replacement material also resists the action of chlorides, sulfates and other salts, thereby providing a durability unknown in ordinary cements.

Setting Characteristics. The replaced cement will set well under all types of muds, whether oil base, water base, high pH, or others. High pH muds may have a dangerously retarding effect on some cements. Many organic materials used in muds are very efficient retarders, while practically all chemical mud thinners retard cement setting. In this study the cement slurries were actually cured in various kinds of drilling fluids and one of the standard conditions set up for a majority of the tests was that

■ CONTINUED ON PAGE 120



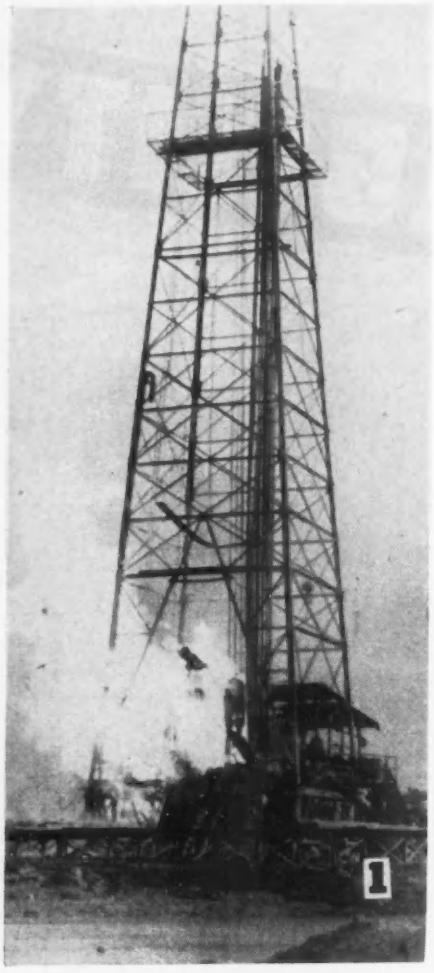
All Lee C. Moore Masts are highly portable; sections are designed so they can be placed on standard, legal road-width trucks for long hauls. Completely assembled masts can be hauled with blocks strung. Special design features of substructure facilitate skidding from one location to another without removing rigging.

A complete range of Lee C. Moore masts is available in sizes from 87' to 142'

Write for Information

LEE C. Moore

LEE C. MOORE CORPORATION TULSA • DALLAS • HOUSTON • MIDLAND • SHREVEPORT
WICHITA • CENTRALIA • PITTSBURGH • Export Office — 9 Rockefeller Plaza, New York 20, N. Y.



The oil well fire in Las Mercedes fields, Venezuela, shortly after a spark started blaze.

Fire Extinguished In Fifty Seconds

Dry Chemical Succeeds Where Other Methods Failed in Venezuela Blaze

A SPECTACULAR oil well fire that raged for five days in the Las Mercedes oil fields of Sociedad Anonima Petrolera Las Mercedes, an affiliate of The Texas Company, in Venezuela, was extinguished by dry chemical fire extinguishers in exactly 50 seconds. It is believed to be the largest oil well fire yet extinguished by dry chemical.

It marked the second time in a little more than a year that dry chemicals have been used to put out a major oil well fire in Venezuela. In 1950, a five-hour fire in another company's field was put out in less than one minute, after all other fire-fighting methods failed.

The Las Mercedes fire started when an electric spark ignited some surface gas. The resulting blowout around the outside of the well casing tossed mud, rocks, water and gas 30 feet into the air. After preliminary attempts to put out the fire with foam, water and carbon dioxide failed, the company summoned outside help by radio. Six 150-pound wheeled units were sped to the scene by truck from distant parts of Venezuela.

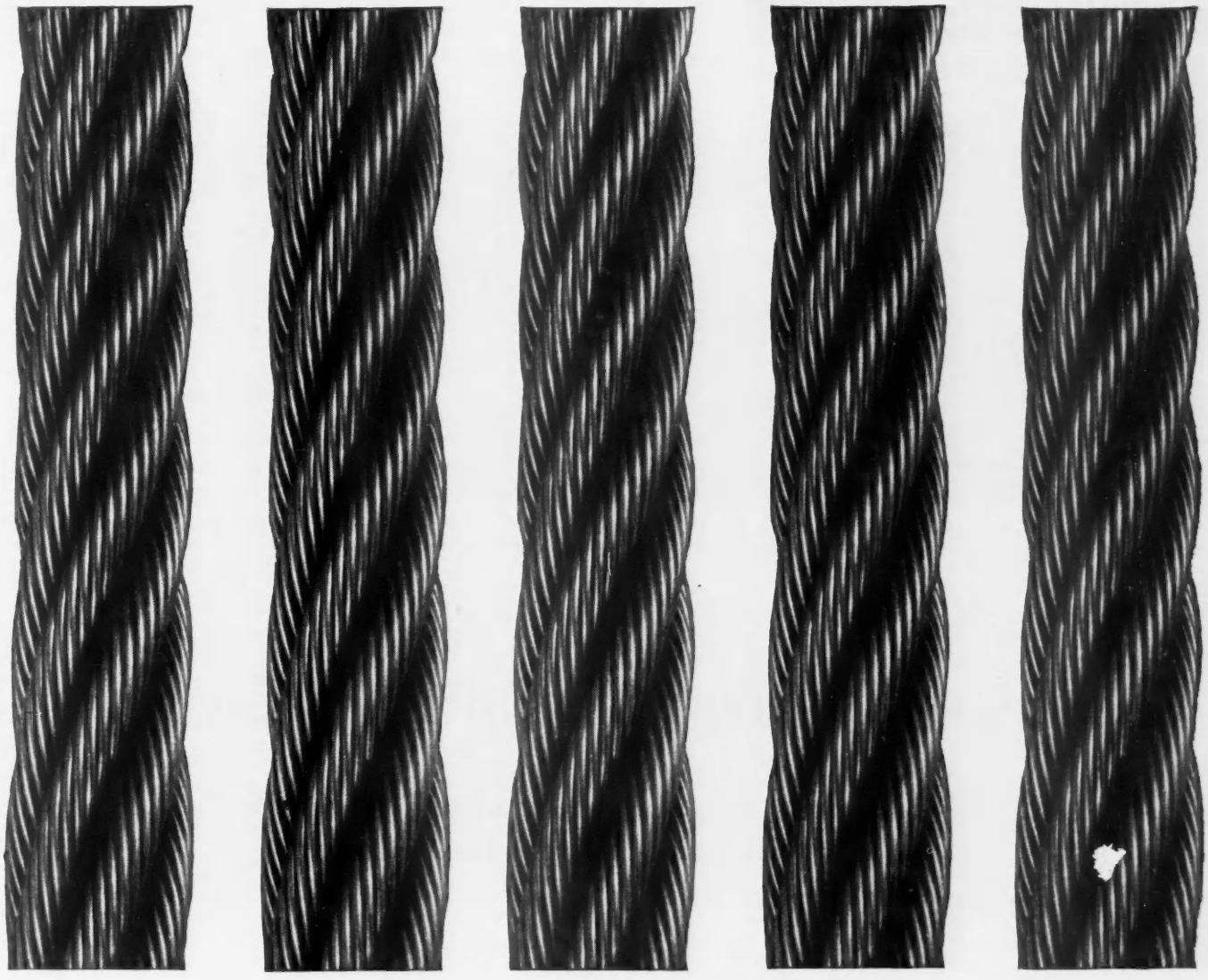
Three of the 150-pounders were provided by the Socony-Vacuum field at Anaco, two from The Texas Company's own pipe line department, and one by C. A. Industrias Waldrip & Campbell of Barcelona. The Texas Company also had twenty 30-pound hand extinguishers flown to the scene.

Because of the time required to obtain the necessary wheeled units, no further attempt was made to extinguish the fire until the morning of the fifth day. By that time, the gas pressure, plus the erupting water and

■ CONTINUED ON PAGE 120

Fire burned on into night. Rig at right melted and toppled from heat of blaze.

Fifty seconds after dry chemical fire extinguisher was put into action, the fire was out. Note streams of water played away from fire to maintain a solid blanket of dry chemical and exclude oxygen.



What sets a good rope apart?

Most wire ropes of the same size and type look pretty much alike—at least when they're new.

But there are differences that soon begin to tell . . . on the really tough jobs.

The carefully-made rope can take the beating. As time goes on, the steel in its wires shows high resistance to wear. The strands remain in alignment. There's little or no distortion. Maybe the rope has been handicapped by small sheaves and drums, but it hasn't broken down under the pressures.

Those are some of the things that set a quality rope apart. They are not the result of chance, but of fine ingredients, expert engineering, and that 'extra ounce of care at every step of manufacture. They are the things that make Bethlehem wire rope a superior product . . . one that fully merits your trust when the going is tough.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

When you think WIRE ROPE . . . think BETHLEHEM

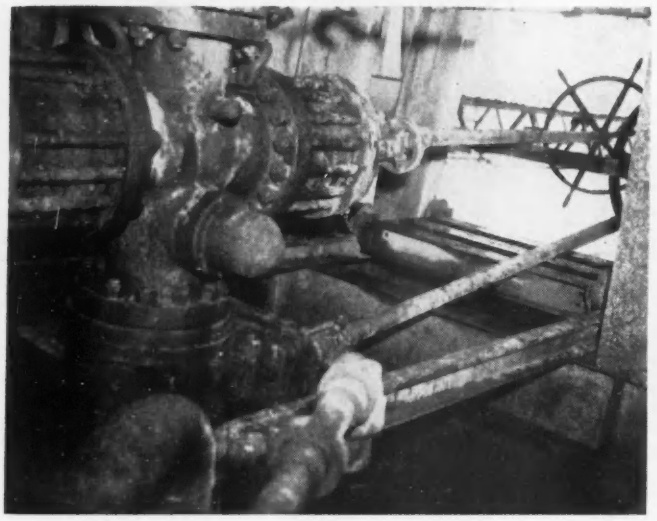


FIGURE 1. Use of a small, flat-decked car rolling on rails which straddle well head, permits safe and rapid moving of preventer to one side while connections are made.

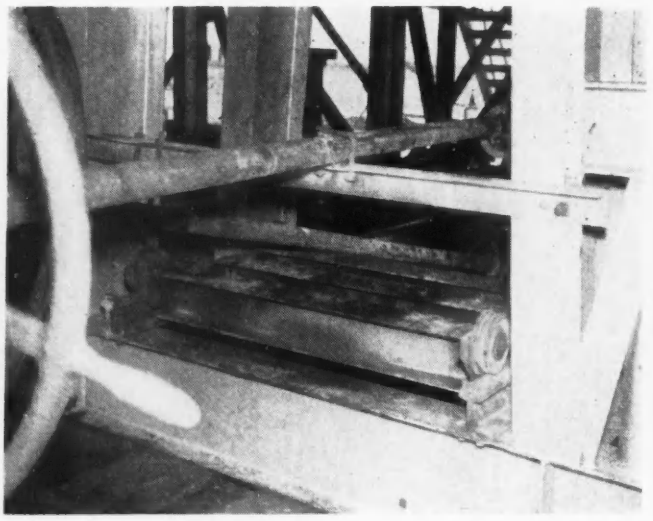


FIGURE 2. Closeup view of car on which blowout preventer is laid. Car is lashed to track in position shown when rig is moved; the longer rail sections being unbolted and laid aside.

Blowout Preventer Handled Safely

Flat-Deck Car Runs on Rails Straddling Wellhead; Four to Six Hours Saved at Each Location

By GILBERT M. WILSON, WORLD OIL Staff

A FLAT-DECK car which runs on rails straddling the wellhead is used by a West Texas-New Mexico operator to reduce hazards involved in removing the blowout preventer when a high-pressure well is being completed.

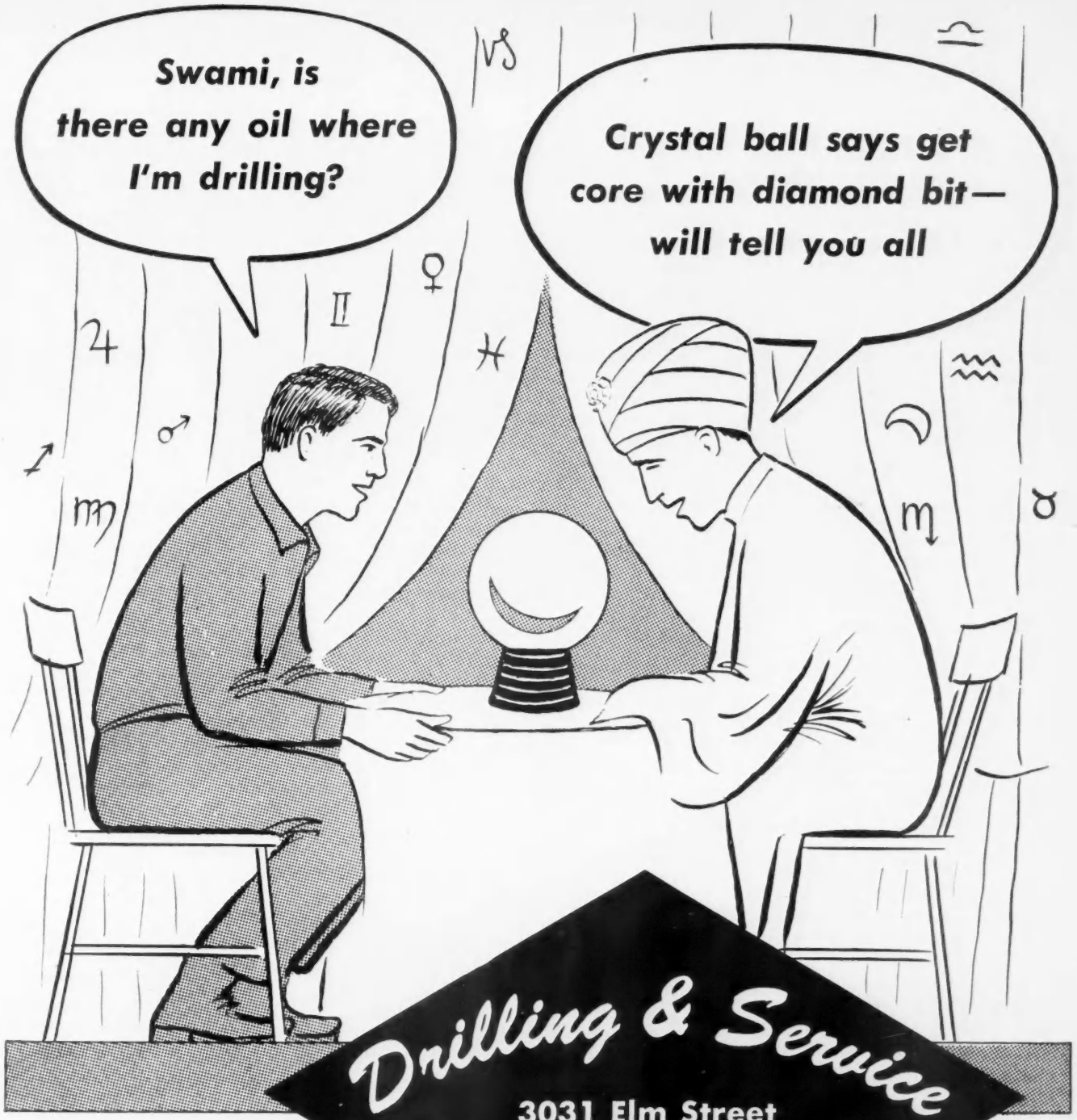
Among the risks normally encountered in the operation is the possibility of crewmen being injured as they work under the derrick floor, standing on muddy or oily planks, or perched on piping adjacent to the wellhead. Much of the time the heavy preventer is suspended above them or temporarily lashed to one side while the christmas tree is installed. A second risk, of much concern to both workmen and the operator, occurs during the time that the well, though temporarily equipped with a choke several joints down or killed with drilling fluid, is open to atmosphere. This is the interval in which the preventer is removed and the production equipment installed. The less time involved in this transfer, the less chance there is of men being injured or of the well getting out of control.

Under the new time-saving system, the rails are bolted to rig substructure members and extend across the entire width of the rig floor. The installation permits placing the blowout preventer once it is lifted clear of the wellhead, directly onto the car. The unit is then rolled to one side, out of the way of subsequent work connected with installing the christmas tree or production fittings.

Rig Time Saved

From four to six hours, it is estimated, are saved at every location through the use of this greatly improved method of handling the preventer. Previously, removal of the preventer involved several steps, each of which was time consuming and, at best, an awkward and risky operation. A line would be lowered through the table opening and the preventer unit then hoisted up as far as possible. Following this, another line, perhaps from the winch of a truck spotted beside the rig and pulling through a snatch block, would be used to pull the heavy unit to one side as far as possible. The preventer would then be lashed against a convenient column in the rig substructure. Still another line would be used to lower the christmas tree through the rotary table opening and the men, working against time beneath the suspended blowout preventer, would install the production control unit.

Under the new system, the blowout preventer, when lifted clear, is lowered onto the convenient car, then pushed to one side and out of the way of subsequent operations in the immediate vicinity of the wellhead. The free-rolling car, with preventer on it, can easily be pushed to one side by only one man. With the preventer quickly pushed out of the way, and without the need for lines that formerly were needed both to suspend and hold it to one side, workmen find they have much more room and can work faster, without fear that the



Drilling & Service

3031 Elm Street

Dallas 1, Texas

Many holes that would have been abandoned as dry a few years ago are now made to produce through advances in production engineering. Diamonds have been responsible for many of these advances because they provide good cores that are invaluable to the production engineer in establishing completion and production practices to insure the ultimate in oil recovery.

Consult your Drilling & Service Engineer

OFFICE PHONE: RIverside 6811
NIGHT NUMBERS: TRemont 5559, VIctor 3708, DIxon 4176

Other Offices — Services

Tyler, Texas	2-2742
Odessa, Texas	6-6774
Abilene, Texas	2-2790
Victoria, Texas	3264
Norman, Okla.	4360
Shreveport, La.	5-5474
Casper, Wyo.	3739
Carmi, Ill.	7799
Ft. Morgan, Colo.	1143
Great Bend, Kans.	7585

Distributors

Diamond Drilling Co., 2759 E. Willow St., Long Beach, Calif., Telephone: Long Beach 40-7949

Allied Services, Inc., Mt. Pleasant, Michigan Telephone: 29-861

Foreign

D. T. O'Connor, 500 Fifth Avenue, New York, N.Y.
Petroleum Industry Consultants, C. A., Caracas, Venez.
Denton-Spencer Co., Ltd., Calgary, Alberta, Canada.

heavy preventer somehow might come loose and swing back, perhaps to injure one or more men.

The rails, which extend from one side of the underfloor area to the other, are spaced 53½ inches apart, on centers. A small stop is welded to each end of the rails to prevent the car from accidentally rolling off the end. The car is constructed of three 48-inch lengths of six-inch H-beam material, the three pieces being spaced a few inches apart and made into a single unit by welding the ends to a common steel plate. The wheels are mounted at the ends of each of these two plates. Wheel axles are 27 inches apart, on centers. Rails are conventional railroad iron and the wheels are of the type used on small mine cars.

Loading on Truck Simplified

When the car and rail installation is used, handling the preventer becomes a much simpler operation. In the first place, there is no need to remove the rotary table; instead, a line is lowered through the kelly bushing opening to lift the blowout preventer before putting it on the car.

Loading the preventer onto a truck backed up to the side of the rig also is simplified, since the unit can be rolled out to the very edge of the underfloor area where the truck's boom line can be hooked onto it. However, even this procedure is not necessary if the rig is to be skidded from one location to another. The photographs reveal that each rail is cut into two parts and bolted separately to the substructure members. One part of the track, that closest to the camera in Figure 2, is only slightly longer than the car itself. When the rig is to be moved, the car, on which the preventer is lashed, is rolled on to this shorter, fixed portion of the track and there securely tied down. The longer pieces of rail are unbolted and temporarily laid aside to permit the rig to be pulled away from the completed well.

The car and rail system represents comparatively little in extra cost of building the rig substructure. It is necessary only to design the underfloor area so that the car can have unobstructed travel from one side of the rig to the other. Even aside from the dollars-and-cents saving involved in its use, the fact that crewmen can work under safe conditions, can get the job done faster and easier, and with reduced risk to the operator, makes the adaptation of the idea to other rigs worthwhile.

Cementing Failures

■ CONTINUED FROM PAGE 114

of a completely oil-base fluid environment.

A good neat cement slurry of proper consistency will usually set up under an oil-base mud, provided that agitation does not disperse oil throughout the slurry; however, these is no excess water present for the continued hydration and strength gain of the set cement. A replaced-cement slurry of equal consistency contains much more water to supply these later needs. Furthermore, actual laboratory tests have proved that the replaced-cement will set even if oil is forced through the slurry after placement.

CONTROLLED SETTING TIME. With preferred replacement percentages, setting time varies much as does that of the neat cement. However, the setting time may be easily controlled through a workable range by the addition of very small amounts of accepted cement accelerators or retarders.

LOWER PERMEABILITY. Permeability of set neat cements varies with the uniformity of the slurry, and is increased by bleeding, leaching and chemical reactions, many of which continue and increase with time. Because of the greater uniformity, minimized bleeding and counteraction of chemical effects, use of this pozzolan decreases and maintains permeability at a very low value.

The use of bentonite may be eliminated inasmuch as the replacement material will accomplish all of the desirable properties of bentonite in cement. However, if still greater yield is desired and strength is unimportant, a combination of the two materials may be effectively used.

When slurry weights below about 95 pounds per cubic foot (12½ pounds per gallon) are desired, the use of lightweight aggregate is essential. Instead of using a thickening agent such as bentonite, 20 percent pozzolan replacement of the cement assures through despersion and the resultant strength is phenomenally increased. This effect is illustrated in Figure 3, where at an actual decrease in cost, strength is increased as much as 117 percent by use of the replacement material.

As yet no actual case histories of field usage have been released. However, those cement jobs in which the material has been used have been quite successful and the operators have saved money in every case. This saving, as explained previously, may easily approach one-fifth or even one-fourth of the cost that might otherwise be entailed.

Fire Quickly Extinguished

■ CONTINUED FROM PAGE 116

rocks, had formed a large crater 50 feet in diameter and 25 feet deep where the drilling rig once stood.

Paul Bunke, acting superintendent at Las Mercedes, ordered the entire well area cleared of all metal and equipment. Then bulldozers threw up a large dike in a semicircle around part of the crater.

At 10 a.m., an attempt was made to extinguish the fire by steam piped to the area from two powerful boilers. This failed. Water was then played on the area for cooling purposes.

Meanwhile, W. S. Waldrip, president of C. A. Industrias Waldrip & Campbell, had supervised the placement of the six dry chemical units in a semicircle behind the earthen dike. At 10:10 a.m., the water hoses were diverted from the fire, and Waldrip and his assistants moved in to fight the fire with dry chemical.

Fifty seconds later, the fire was out.

A final ball of fire hanging suspended at the far lip of the crater was doused by Waldrip. He descended part way into the crater to extinguish the fire with his last bit of dry powder. High pressure water lines were immediately played into the crater to prevent a flashback. With the fire out, the company recapped the well in four days.

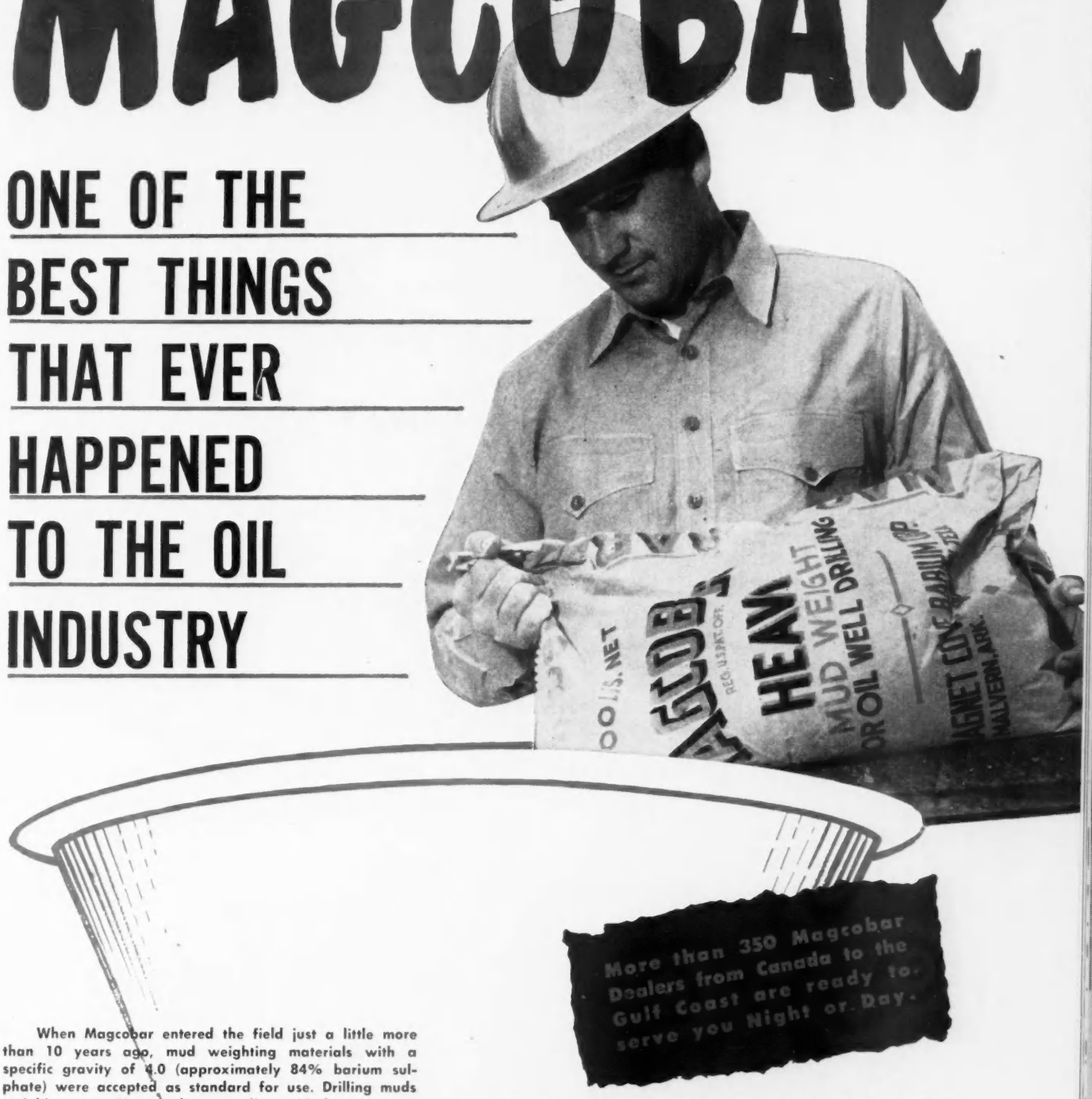
Dry chemical is nothing more than specially treated sodium bicarbonate. It differs from ordinary baking soda in that it is free-flowing and moisture-repellent, so that it can be expelled through an extinguisher without clogging up the outlets.

Dry chemical works faster in extinguishing fires of flammable liquids. Fire quickly breaks down the chemical particles, creating a blanket of carbon dioxide over the flame. With oxygen excluded, the fire is quickly snuffed out. Engineers point out that the hotter the fire, the faster its extinguishment, because the chemical particles are broken down faster. This accounts for the speedy extinguishment of the Las Mercedes blaze.

Also of great help were the lessons learned in putting out the 1950 oil well blaze in Venezuela. At that time, the fire fighters tried to put out the fire with dry chemical, plus two streams of water. The effort failed, apparently because the water knocked a hole in the dry chemical blanket, thereby providing a source of oxygen for the fire. Later, the fire was put out by dry chemical alone. Thus, the fire fighters at Las Mercedes had a sound precedent when they diverted their water stream before going in with dry chemical.

MAGCOBAR

ONE OF THE BEST THINGS THAT EVER HAPPENED TO THE OIL INDUSTRY



More than 350 Magcobar Dealers from Canada to the Gulf Coast are ready to serve you Night or Day.

When Magcobar entered the field just a little more than 10 years ago, mud weighting materials with a specific gravity of 4.0 (approximately 84% barium sulphate) were accepted as standard for use. Drilling muds weighing over 15 pounds per gallon with low viscosity seemed next to impossible.

Today, the standard for mud weighting materials is a specific gravity of 4.25 to 4.35 (approximately 95% barium sulphate). Drilling muds weighing up to 19 pounds per gallon with low viscosity are used in many heavy pressure areas.

Yes, drilling mud quality is much higher today because Magcobar developed and pioneered the first commercial production of barite beneficiated by the flotation process in 1940. This method produced barite that was not only higher quality, but also very uniform. Furthermore, by this process, low grade barite ores could be turned into high grade products . . . and this alone added many millions of tons of reserves which were made available to the oil industry for drilling mud.

Since those early days, the oil industry's wide acceptance of Magcobar's high quality products, good service and fair and reasonable prices has enabled Magcobar to be of even greater service to the only industry it serves.

So when you need dependable drilling mud service, call Magcobar first. Magcobar is one of the best things that ever happened to the oil industry.

Magcobar

Complete

DRILLING MUD SERVICE

DEALER

MAGCOBAR • MAGCOGEL • HIGH YIELD • MAGCO-FIBER • XACT CLAY • FIBER SEAL • LEATHER-FLOC • FORM-A-PLUG • CELL-O-SEAL SALT GEL • MAGCO-PHOS • RED OX • MAGCO-MICA • TANNATHIN JEL-OIL MUD • JEL-OIL "E" • "E" CONCENTRATE • NOHEEV MY-LO-JEL PRESERVATIVE • QUEBRACHO • CHEMICALS

Effect of Calcium Sulfate On Properties of a Bentonite Suspension

Effect of Mineral Contamination Versus Remedial Attack Afforded by Combined Caustic Soda and Quebracho Is Cited

By W. E. BERGMAN

Research Division, Phillips Petroleum Company

Part 2—CONCLUSION

THE effect of $CaSO_4$ upon the physical properties of the 30 cpe suspension of bentonite pretreated with 1, 3 or 5 pounds quebracho per barrel is shown in Figures 2, 3 and 4 as a function of pH. The relationship between the pH of the unaged and aged suspensions and the amount of NaOH added simultaneously with the quebracho is summarized in Figure 5. While the latter graph does not show curves for all concentrations of $CaSO_4$, pH values may be interpolated to give results within limits of experimental error. The symbols in Figures 2, 3 and 4 do not represent experimental points; the number of determinations on which the smooth curves in these figures was drawn is illustrated by symbols for the curves of Figure 5. From the data presented in Figure 2, 3 and 4 curves were drawn to show the effect of the concentration of quebracho and of $CaSO_4$ upon the viscosity for the various fixed pH values in the range of 10 to 13 (Figures 6 and 7).

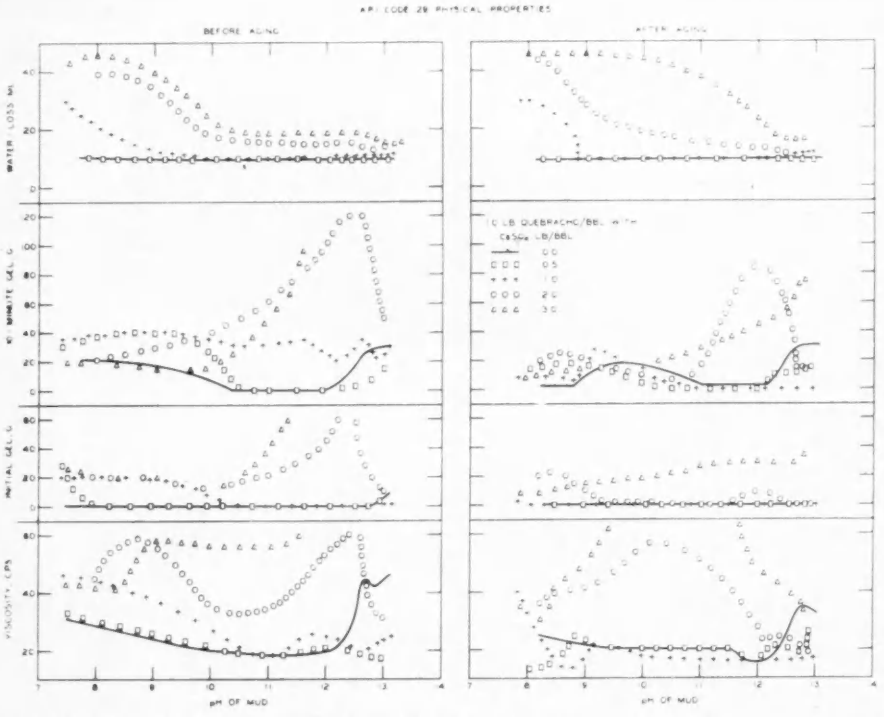
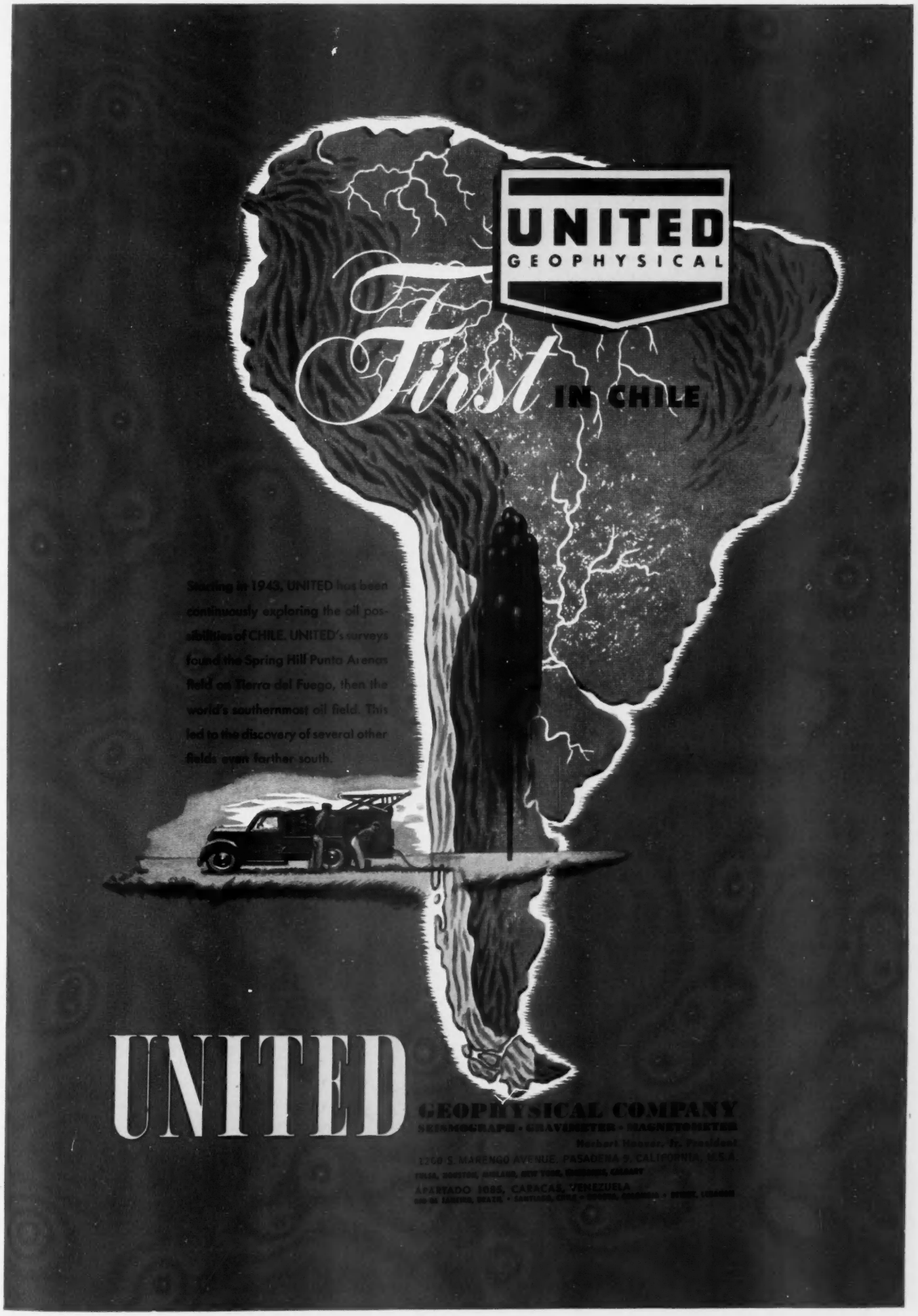


FIGURE 2. Effect if $CaSO_4$ as a function of pH upon physical properties of 30 cps suspension of bentonite pretreated with 1.0 pounds of quebracho per barrel and variable NaOH. $CaSO_4$ was added 15 minutes after NaOH and quebracho and stirring continued for 30 minutes. Aliquots of suspensions were aged at 80° C. for 18 hours, cooled, stirred 30 minutes and retested.

Because of the number of variables and complexity of the system the discussion of these results will be limited to the most pertinent factors. Further, for simplicity, attention will be focused mainly on the viscosity of the mud and not the gel strengths. In many cases changes in viscosity parallel change in gel strengths but notable exceptions do occur.

In the absence of added $CaSO_4$ the curves relating viscosity to pH are closely analogous to those previously reported.[1] The viscosity is at a minimum in the pH range of 11 to 12. Further increase in pH causes an abrupt increase in viscosity, the rate and magnitude of the increase being inversely related to the concentration of quebracho (Figure 6). It should be noted that in the absence of added $CaSO_4$ there is little advantage for having the quebracho concentration above 1 pound per barrel to achieve minimum viscosity in the pH range of 11 to 12. For pH values greater than 12.5 concentrations of quebracho greater than 1 pound per barrel are detrimental in that the results show that the viscosity and water-loss values increase considerably upon aging.

The curves shown in Figures 2, 3 and 4 show that the effect of low concentrations of $CaSO_4$ (0.5-1 pounds per barrel) is a unique function of the pH for both aged and unaged mud and considerably different than the effect of higher concentrations. Thus the curves of Figure 7 show that for pH values greater


UNITED
GEOPHYSICAL
First IN CHILE
Starting in 1943, UNITED has been continuously exploring the oil possibilities of CHILE. UNITED's surveys found the Spring Hill Punta Arenas field on Tierra del Fuego, then the world's southernmost oil field. This led to the discovery of several other fields even farther south.
UNITED
GEOPHYSICAL COMPANY
SEISMOGRAPH · GRAVIMETER · MAGNETOMETER
Norbert Hoover, Jr. President
1260 S. MARENGO AVENUE, PASADENA 9, CALIFORNIA, U.S.A.
APARTADO 1085, CARACAS, VENEZUELA

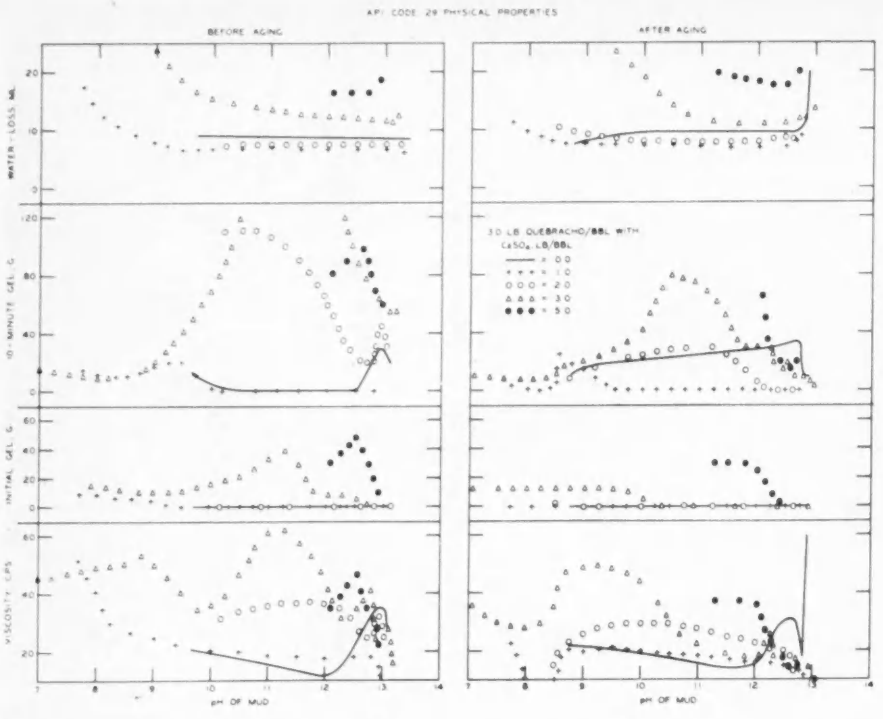


FIGURE 3. Effecf of $CaSO_4$ as a function of pH upon physical properties of 30 cps suspension of bentonite pretreated with 3.0 pounds quebracho per barrel and variable NaOH. Conditions same as described in Figure 2.

than about 12.5 the viscosity is lower when the $CaSO_4$ is 0.5 or 1 pound per barrel than when no $CaSO_4$ is present. In other words such low concentrations of $CaSO_4$ eliminate the abrupt increase in viscosity which in the absence of $CaSO_4$ occurs at about pH 12.5. Further, the values for the gel strengths and water-loss for muds containing 0.5 or 1 pound $CaSO_4$ per barrel are frequently lower in the pH range 10-13. These phenomena with low concentrations of $CaSO_4$ are probably closely related to the effect of lime when used with quebracho to produce the so-called lime-based muds. Van Dyke and Hermes illustrated the use of lime with quebracho to produce an enhanced lowering of the viscosity of a bentonite suspension.[2] For the experiments herein described lime is formed in situ by reaction of the $CaSO_4$ with NaOH.

For concentrations of $CaSO_4$ higher than 1 pound per barrel the viscosity, gel strengths and water-loss values increase rapidly as the concentration of $CaSO_4$ is increased. The magnitude of the increase is highly dependent upon the pH and quebracho concentration. As is well known from field experience, the effects of high concentrations of $CaSO_4$ are minimized by increase in pH and concentration of quebracho. There appear, however, practical limits for either the amount of NaOH or of quebracho which may be used to achieve a high pH mud. This factor is illustrated most clearly in Figure 4 where it will be noted that for aged muds the viscosity and water-loss increase abruptly at about pH 12.5. In this graph the pH at which this effect occurs when the $CaSO_4$ is present in amounts of 0, 1 and 2 pounds per barrel is inversely related to the concentration of $CaSO_4$. With 3 and 5 pounds $CaSO_4$ per barrel no increase is shown but extension of the data would probably show an analogous effect. This abrupt increase in viscosity and water-loss is believed to be due to the rapid increase in the concentration of hydroxide ion in the aqueous phase of the mud following decomposition of the $CaSO_4$ to $Ca(OH)_2$. A rapid increase in the concentration of OH^- in the filtrate would not occur until NaOH has been added in amounts stoichiometrically in excess of the $CaSO_4$.

Results from Analysis of Filtrates

During the course of this study many of the filtrates from aged muds pretreated with NaOH and quebracho were analyzed. No close relationship was found between the analytical results for Ca^{++}, $SO_4^=$, HCO_3^-, $CO_3^=$ and OH^- and the physical properties of the mud. However, the results are of interest in

TABLE 4

The Calcium in Filtrates of Muds Aged at 80° C. for 18 Hours for Various Concentrations of Quebracho and of $CaSO_4$

Quebracho, Lb./Bbl.	$CaSO_4$, Lb./Bbl.	Ca^{++}, ppm in Filtrate at pH 11	pH 12	pH 12.5	pH 13
1.0	0.5	130	120	100	....
1.0	1.0	140	150	100	....
1.0	2.0	380	300	150	....
1.0	3.0	850	600	200	....
3.0	1.0	260	300	360	350
3.0	2.0	280	300	290	280
3.0	3.0	480	350	300	....
5.0	3.0	250	250	250	....

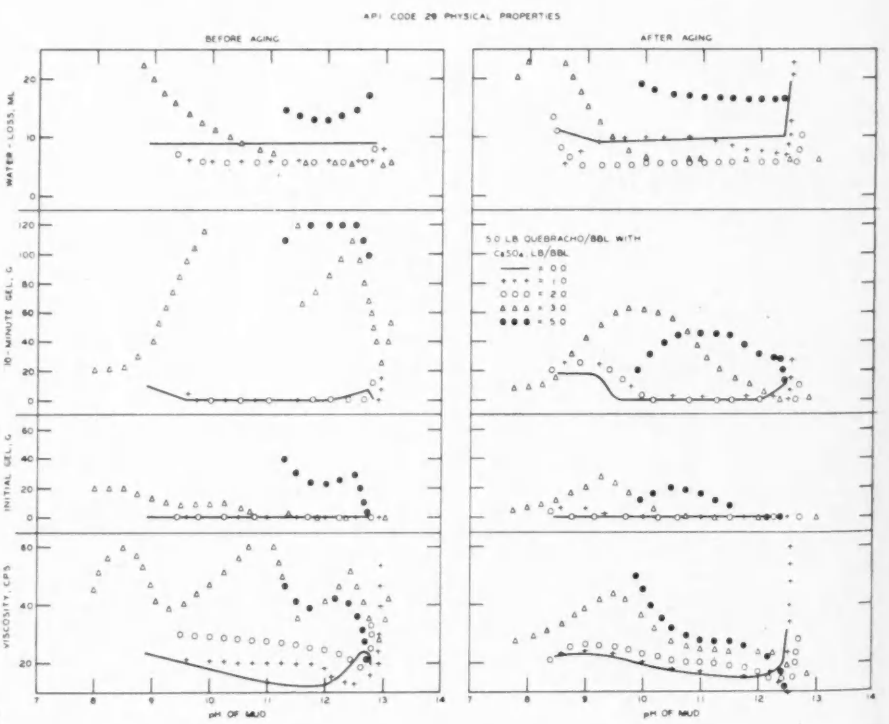
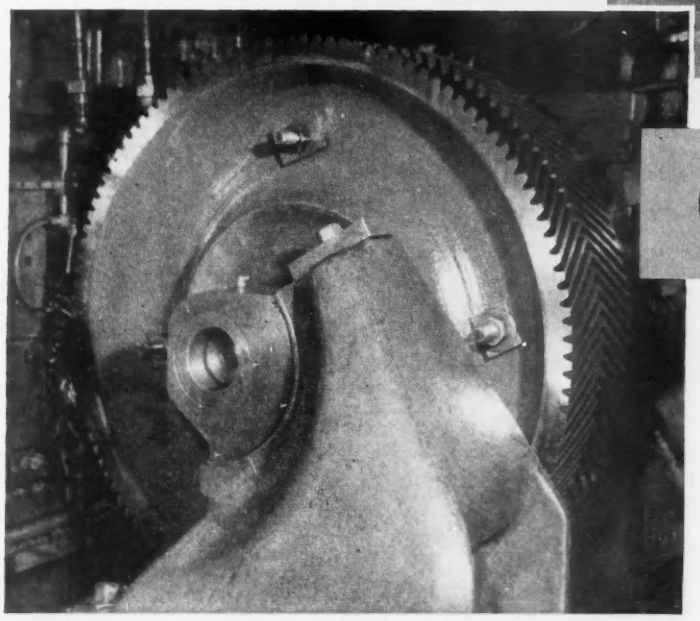


FIGURE 4. Effect of $CaSO_4$ as a function of pH upon physical properties of 30 cps suspension of bentonite pretreated with 5.0 pounds of quebracho per barrel and variable NaOH. Conditions same as described in Figures 2 and 3.

Good Steel

Good Blank



Good Gear

No gear is any better than the blank from which it's made. If you start with a blank that's sturdy from rim to hub, one that contains high-quality steel, many production problems are licked at the outset.

Bethlehem blanks have everything you need in the making of a good, tough gear. These heavy-duty products are of clean, sound steel of uniform density.

The blanks are not just rolled, not just forged, but *both*. Rolling and forging are combined in a single operation—one that shapes the hot blocks of steel and helps make the metal compact and homogeneous.

Blanks so processed are very strong; in fact, this advantage often makes possible the use of lighter sections. Another thing—the grain structure is excellent. That's a point your machinist will appreciate. Whether his cut is shallow or deep, he'll find the going easy. No hidden trouble down beneath.

Try some of these highly-dependable blanks when making spur, bevel, miter, and other types of gears. They are furnished untreated or heat-treated, in sizes ranging from 10 to 42 in. OD.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM ROLLED-AND-FORGED CIRCULAR PRODUCTS

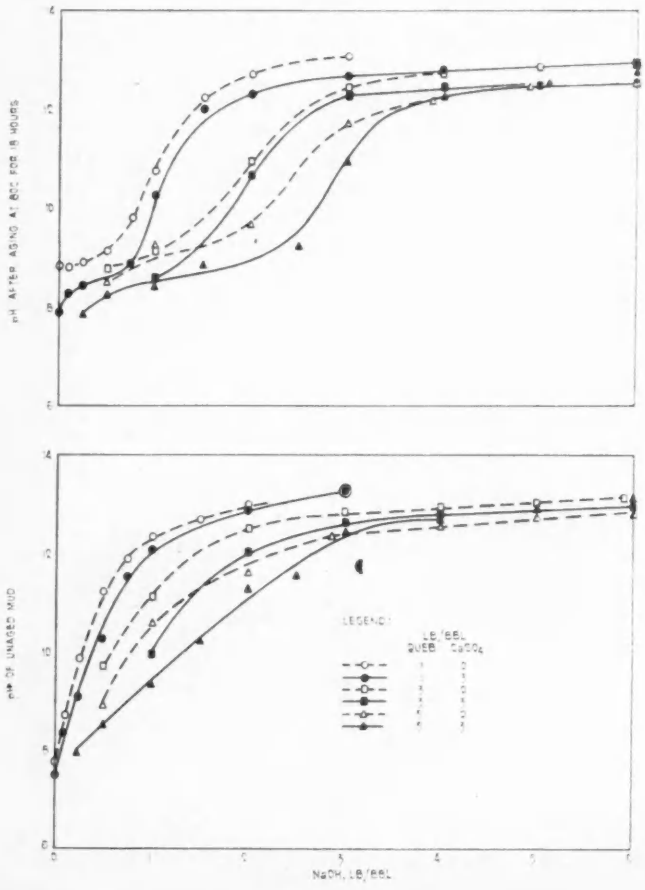
elucidating the chemical reactions which occur in the mud and may clarify the results obtained from pilot tests in the field. Figure 8 shows complete data for two series of tests. These and other more limited data showing the effect of pH, quebracho and $CaSO_4$ are summarized in Table 4.

The tests of Figure 8 with the $CaSO_4$ at 3 pound per barrel will be discussed first. For this series sufficient $CaSO_4$ is present to form a saturated solution in the pH range below 9. This is indicated by the fact that the sulfate ion in the filtrate is not at its maximum value until a pH greater than 9 is reached. An increase in $SO_4^{=}$ concentration in the filtrate is always to be expected when a mud containing $CaSO_4$ as a solid phase is treated with NaOH. The maximum value for the sulfate in the filtrate after solubilization of the solid phase $CaSO_4$ then becomes a direct measure of the extent of contamination by $CaSO_4$. The curve for Ca^{++} increases to a maximum of 800 parts per million at a pH of about 8.5. On the basis of the reaction between $CaSO_4$ and NaOH in pure water this increase could be attributed to the saturation of the aqueous phase with $Ca(OH)_2$. This is illustrated in Figure 9. Addition of CaO to a saturated solution of $CaSO_4$ increases the Ca^{++} from 620 ppm to a value of 1420 ppm when the solution is saturated with both $CaSO_4$ and $Ca(OH)_2$. Also Figure 9 shows that when an aqueous suspension containing 3 pounds $CaSO_4$ per barrel is treated with NaOH the Ca^{++} reaches a maximum value of about 800 ppm. While a close analogy appears to exist between the reaction of NaOH with $CaSO_4$ in water as shown in Figure 9 and the reaction in the mud as shown in Figure 8, one important fact must not be overlooked: negligible hydroxide exists in this mud until a pH of 11.5 is attained. Therefore one cannot postulate the presence of $Ca(OH)_2$ as a solid phase (unless the solubility is zero) until a pH greater than 11.5 is reached. The fact that the maximum value for Ca^{++} (800 ppm) is the same in this mud as in the aqueous system without clay or quebracho is fortuitous. It appears, then, that in a system containing clay and quebracho the $Ca(OH)_2$ which is formed from $CaSO_4$ and NaOH reacts with the bentonite or quebracho. As previously stated, in alkaline solution calcium may react with clays or silica present as impurities in the clay to form highly insoluble calcium salts. The extent of such reactions under conditions analogous to those occurring in drilling muds has not been measured. A few experiments herein reported will, however, indicate the effect of quebracho in the absence of clay, upon the reaction between $CaSO_4$ and NaOH.

The decrease in Ca^{++} which occurs at about pH 12.5 for both curves of Figure 8 can be attributed to the fact that as the concentration of OH^- increases the solubility of $Ca(OH)_2$ is exceeded, and Ca^{++} is precipitated as $Ca(OH)_2$. Figure 9 shows that the solubility of $Ca(OH)_2$ is an inverse function of the concentration of free hydroxide (NaOH).

The results shown in Figure 8 for the mud containing 0.5 lb $CaSO_4$ per barrel differ considerably from those just discussed. Insufficient $CaSO_4$ is present to saturate the aqueous phase of the mud. The increase in the Ca^{++} in the filtrate as the pH is raised from 8 to 11.5 may be due to exchange of Ca^{++} adsorbed on the clay by Na^+ added as NaOH.

The results for $CO_3^{=}$, HCO_3^- shown in Figure 8 should be noted. As stated in the experimental procedure, que-



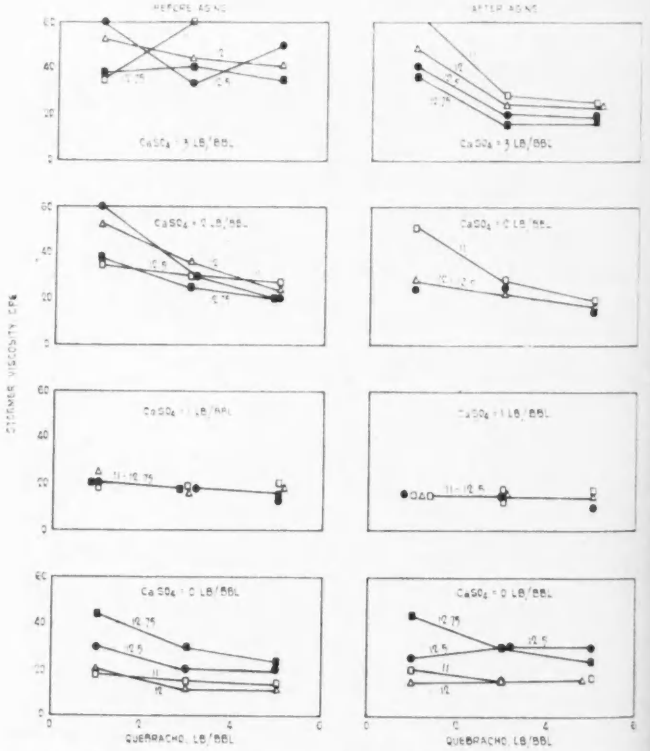
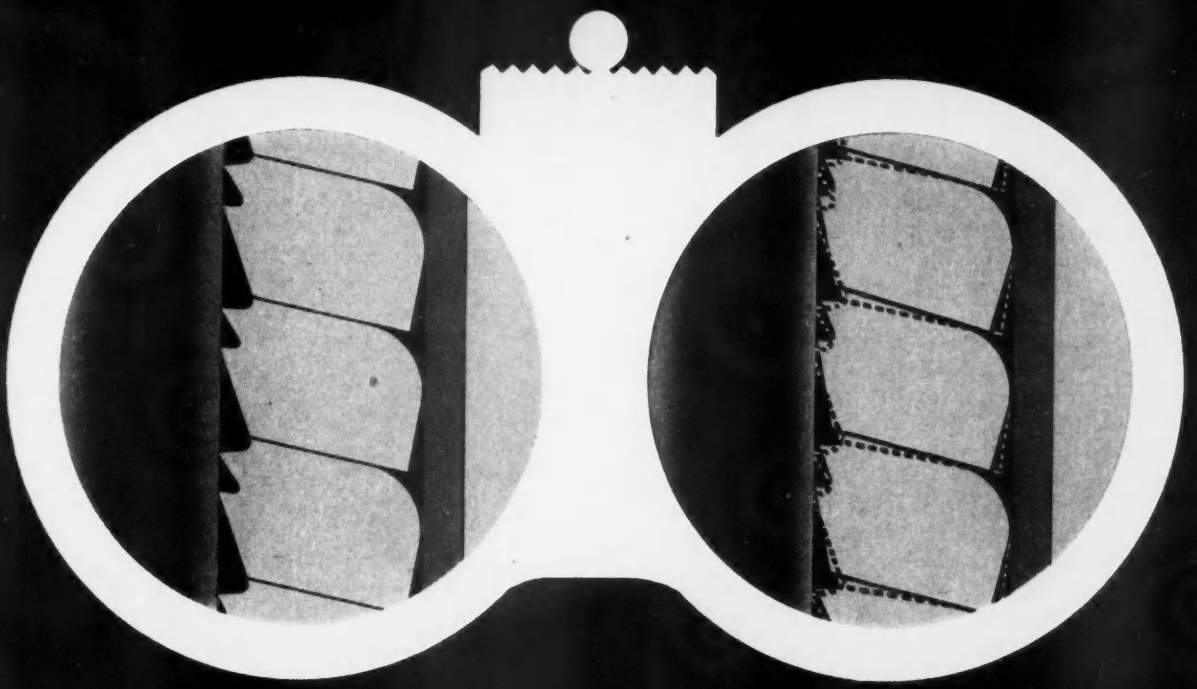


FIGURE 5 (left). The pH of the bentonite suspensions as function of amount of NaOH, quebracho and $CaSO_4$.

FIGURE 6 (above). Effect of quebracho concentration upon viscosity of bentonite suspension at pH 11, 12, 12.5 and 12.75 with 0, 1, 2 and 3 pounds $CaSO_4$ per barrel.



Double Barrel Action

Mission

Rolling Dog

Rotary Slips

You get quicker, more dependable action and faster round trips with the exclusive Mission *Rolling Dog* principle! *They grip* instantly and settle evenly into positive holding action. *They release* instantly and evenly with the first upward movement of pipe. This double barrel Mission action speeds up drilling, protects your pipe. Specify Mission *Rolling Dog* Rotary Slips at your supply store. Mission makes slips for any length casing or tubing strings.

MISSION
MANUFACTURING CO.

HOUSTON, TEXAS
Export office: 30 Rockefeller Plaza, New York

bracho and other components in the filtrate interfere with the titration for these components. It is untenable to assume that $CO_3^{=}$ is present in amounts greater than a few parts per million in a high pH mud containing appreciable free Ca^{++} since all solubility data indicate that $CaCO_3$ is essentially insoluble under such conditions. These results, therefore, must be assumed to be in error and, possibly, an indirect measure of quebracho in the filtrate. Errors in $CO_3^{=}$ and HCO_3^{-}, of course, produce equivalent errors in the value for OH^{-}. However, the type of curves showing the relationship between these components is typical of others obtained in this laboratory in showing that the HCO_3^{-} becomes zero at pH of about 11.5 and that above pH 11.5 the hydroxide ion concentration increases.

Data limited to the high pH range which summarize the effect of quebracho and $CaSO_4$ concentration upon the Ca^{++} in filtrates of aged muds are shown in Table 4. For the series of tests with quebracho at 1 pound per barrel the calcium in the filtrate is directly related to the extent of contamination with $CaSO_4$ and inversely related to the pH. A similar relationship should be expected in the absence of quebracho or clay. However, the data with the quebracho at 3 pounds per barrel do not show the same relationship between pH and concentration of $CaSO_4$. For example with concentrations of $CaSO_4$ of 2 pounds per barrel or less increase in pH from 11 to 12 increases the concentration of Ca^{++} in the filtrate. This increase is analogous to that shown in Figure 8 for the mud containing 0.5 pound $CaSO_4$ per barrel.

For a fixed amount of $CaSO_4$ it appears that the Ca^{++} in the filtrate for the pH range of 11 to 12.5 goes through a maximum as the quebracho concentration is increased but these data are too limited to define accurately the effect of quebracho concentration. Other experiments, described below, indicate that the effect of quebracho in this system is complex.

The Effect of Various Electrolytes Upon the Equilibria in Water Solutions of $CaSO_4$ and $Ca(OH)_2$

During the course of previous discussion reference was made to the various equilibria in pure water presented in Figures 9 and 10. It is, admittedly, precarious to draw a close analogy between such data with that obtained in a drilling mud. However, a knowledge of such data is important for an understanding of what may occur in a drilling mud. Results on the effect of quebracho and of quebracho with NaOH on the solubility of or reaction with $CaSO_4$ or $Ca(OH)_2$ have not been found in the literature. Other data shown here are in close agreement with that summarized by Seidell.[3] Data for $Ca(OH)_2$ as well as $CaSO_4$ are shown in Figure 9 since both these compounds may occur as a solid phase in the muds being studied.

The results for the effect of NaCl on the solubility of $CaSO_4$ or of $Ca(OH)_2$ illustrate the effect of any electrolyte upon the solubility of another salt not having a common ion—in this case Ca^{++} or $SO_4^{=}$. Moderate concentrations of these electrolytes increase the solubility. Although not shown by these results larger amounts of such an electrolyte may decrease the solubility to a value less than that in pure water.

Sodium sulfate in amounts to 10

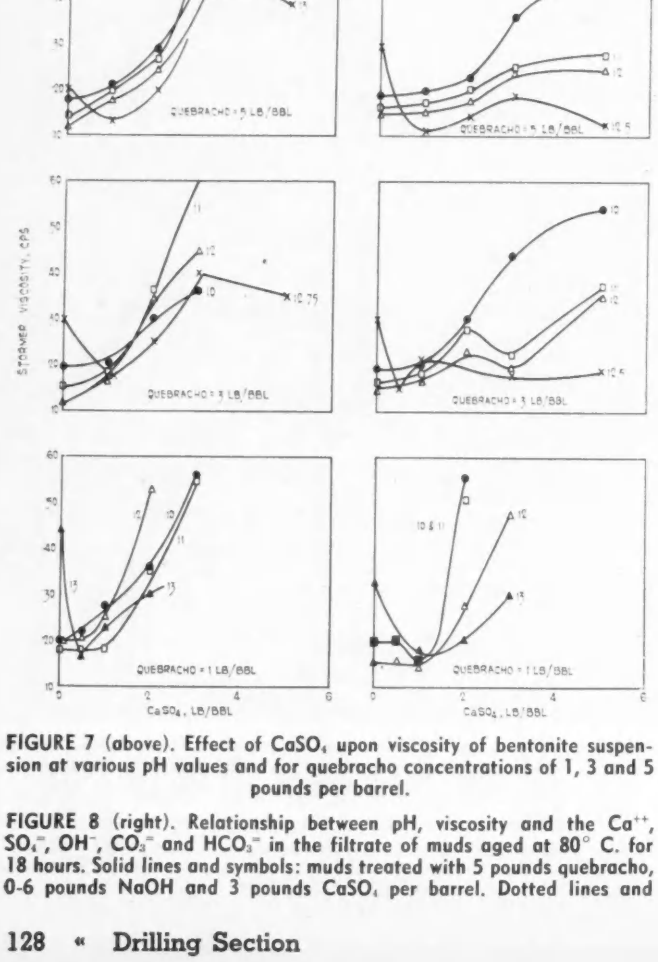


FIGURE 7 (above). Effect of $CaSO_4$ upon viscosity of bentonite suspension at various pH values and for quebracho concentrations of 1, 3 and 5 pounds per barrel.

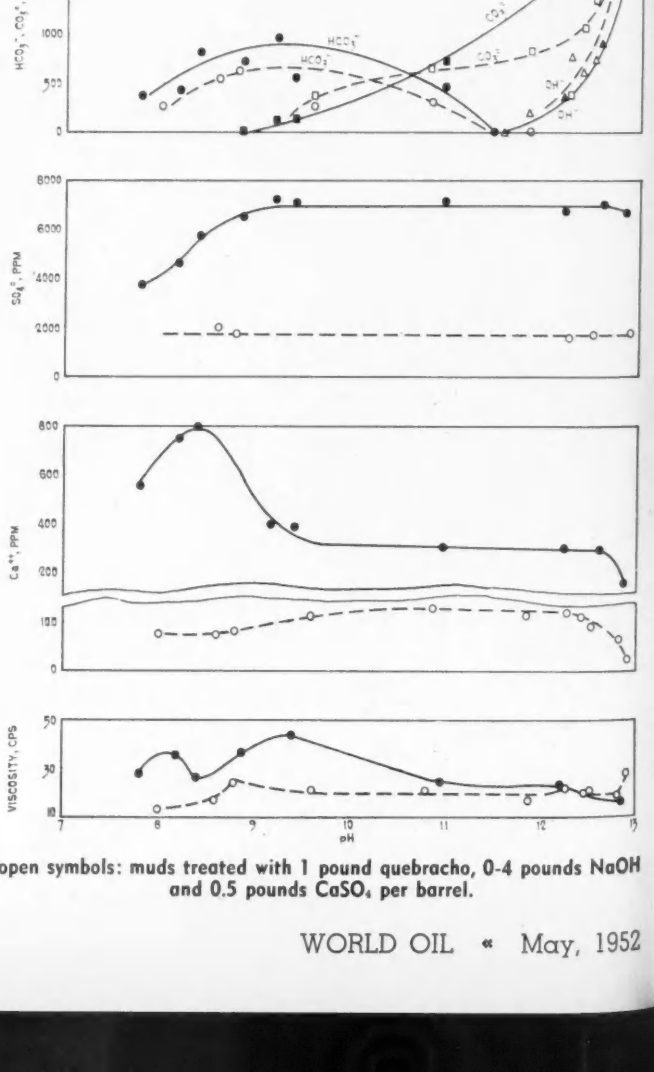
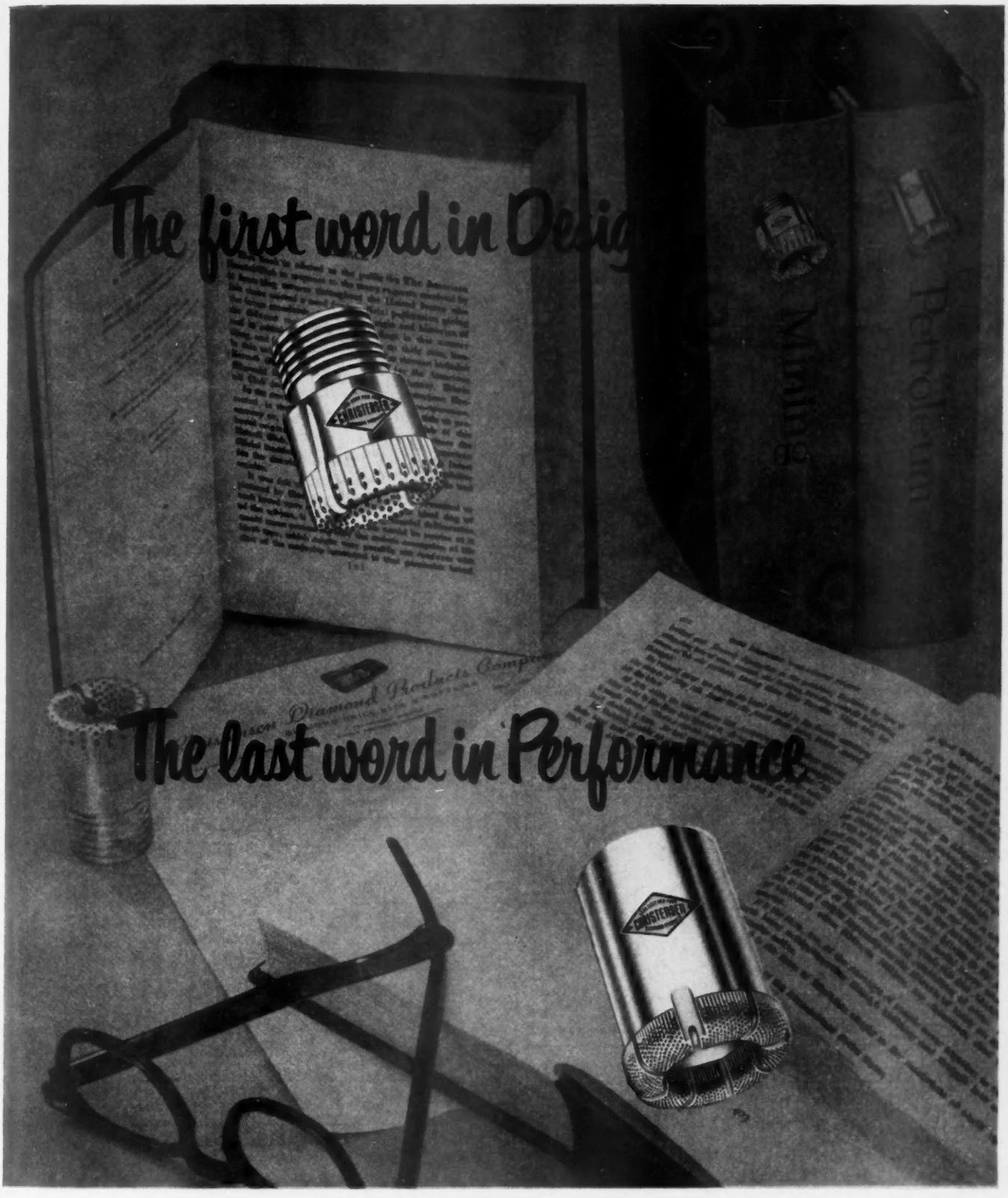


FIGURE 8 (right). Relationship between pH, viscosity and the Ca^{++}, $SO_4^{=}$, OH^{-}, $CO_3^{=}$ and HCO_3^{-} in the filtrate of muds aged at 80° C. for 18 hours. Solid lines and symbols: muds treated with 5 pounds quebracho, 0-6 pounds NaOH and 3 pounds $CaSO_4$ per barrel. Dotted lines and open symbols: muds treated with 1 pound quebracho, 0-4 pounds NaOH and 0.5 pounds $CaSO_4$ per barrel.



CHRISTENSEN

DIAMOND PRODUCTS CO.

LESS COST PER FOOT
CHRISTENSEN
DIAMOND PRODUCTS

SEE OUR CATALOG IN THE COMPOSITE CATALOG

SEE OUR CATALOG IN DIAMOND DRILL MINING CATALOGS

1937 SOUTH 2nd WEST • PHONE 6-8738 • SALT LAKE CITY, UTAH

pound per barrel decreases the solubility of $CaSO_4$. This may be attributed to the well-known common ion effect. The effect of Na_2SO_4 on the solubility of $Ca(OH)_2$ is unique. Amounts to 2 pound per barrel increase the Ca^{++} in equilibrium with the solid phase, and the solution becomes saturated with both $Ca(OH)_2$ and $CaSO_4$. As the concentration of Na_2SO_4 is increased all the $Ca(OH)_2$ present as a solid phase is decomposed into $CaSO_4$:

$$Ca(OH)_2 + Na_2SO_4 \rightarrow CaSO_4 + 2\ NaOH$$

When all the $Ca(OH)_2$ has been decomposed the effect of more Na_2SO_4 is the same as that upon a saturated solution of $CaSO_4$ containing an amount of NaOH equivalent to the $Ca(OH)_2$ which was decomposed.

As previously discussed addition of NaOH to a saturated solution of $CaSO_4$ results in decomposition of any solid phase $CaSO_4$ by the reaction.

$$CaSO_4 + 2\ NaOH \rightarrow Ca(OH)_2 + Na_2SO_4$$

According to this equation the decomposition of 1 pound $CaSO_4$ requires 0.58 pound NaOH. However, these data show that complete solubilization of the $CaSO_4$—as indicated by maximum value for $SO_4^{=}$—is not achieved until the NaOH is considerably in excess of the $CaSO_4$. In other words the extent of the reaction indicated by the above equation is dependent not only upon the amount of NaOH but also by the concentration of $SO_4^{=}$ in solution. This was proved by the fact that the reverse reaction did occur as shown by the effect of Na_2SO_4 upon the equilibrium in the saturated solution of $Ca(OH)_2$. When all solid phase $CaSO_4$ has been decomposed by NaOH to $Ca(OH)_2$ the concentration of Ca^{++} decreases rapidly. This is analogous to the effect of NaOH upon the solubility of $Ca(OH)_2$ and is attributable to the common ion effect.

To show the effect of quebracho upon the reaction between $CaSO_4$ and NaOH, experiments were conducted with aqueous suspensions containing 3 pounds $CaSO_4$ per barrel. Figure 10 shows the Ca^{++}, $SO_4^{=}$ and OH^- in filtrates from suspensions containing 0, 1, 3 and 5 pound quebracho per barrel as a function of NaOH. These suspensions were aged at room temperature. Analogous results were obtained by aging the suspensions at 80°C and stirring 2-4 hours at room temperature before filtration.

In the absence of NaOH increase in the concentration of quebracho results in a slight increase in the concentration of Ca^{++} and $SO_4^{=}$. While the filtrate from an aqueous suspension containing 5 pounds quebracho per barrel gave 93 ppm Ca^{++} and 288 ppm SO_4—corresponding closely to the effect of quebracho—in amounts of 5 pounds per barrels upon the solubility of the $CaSO_4$—any Ca^{++} and $SO_4^{=}$ present in the quebracho as impurities in excess of that required to form a saturated solution would pre-

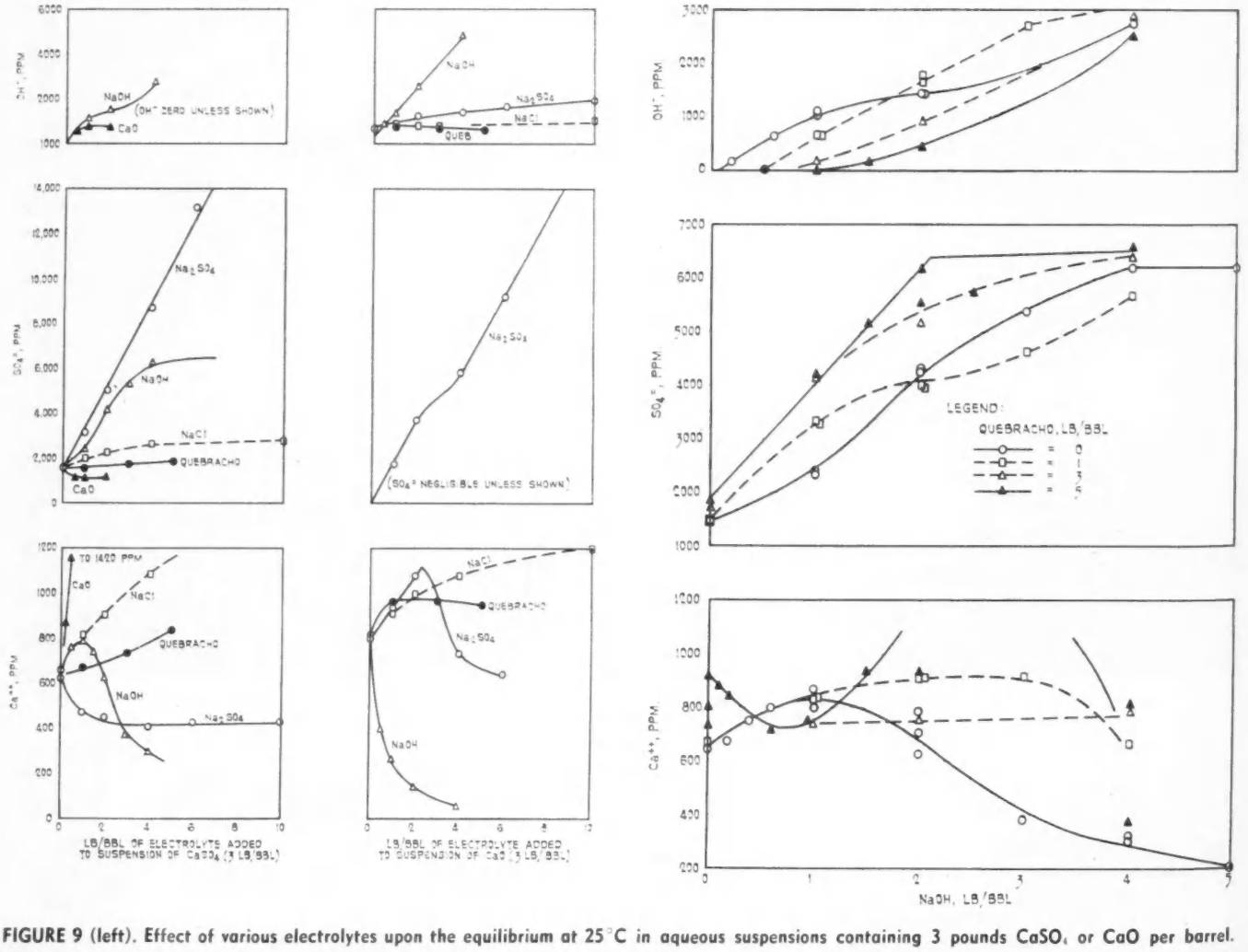


FIGURE 9 (left). Effect of various electrolytes upon the equilibrium at 25°C in aqueous suspensions containing 3 pounds $CaSO_4$ or CaO per barrel.

FIGURE 10 (right). Effect of quebracho upon reaction between $CaSO_4$ and NaOH. Quebracho was hydrated in water containing the NaOH. $CaSO_4$ was then added. After aging at 25° C for 16 hours the suspensions were filtered and Ca^{++}, $SO_4^{=}$ and OH^- determined in the filtrate.

cipitate. Consequently, the small increase in the solubility of $CaSO_4$ by quebracho can be most simply attributed to the effect of the quebracho on the ionic strength. As is well known, moderate amounts of any electrolyte may increase the solubility of another electrolyte not having a common ion. Such an effect is illustrated in Figure 9 where it is shown that NaCl increases the solubility of either $CaSO_4$ or $Ca(OH)_2$.

In the presence of NaOH the reaction becomes complex. Figure 10 shows that for concentrations of NaOH to 2 pounds per barrel the $SO_4^=$, and hence the amount of $CaSO_4$ solubilized, increases directly and the OH^- increases inversely with increase in concentration of quebracho. This is equivalent to saying that the reaction

$$CaSO_4 + 2NaOH \rightarrow Ca(OH)_2 + Na_2SO_4$$

is promoted by quebracho by formation of an insoluble (non-filterable) complex with $Ca(OH)_2$. Such an explanation does not hold when the NaOH is greater than 2 pounds per barrel. For such high concentrations of NaOH the $SO_4^=$ and OH^- in the filtrate no longer are a simple function of quebracho concentration. A possible explanation for what appears to be such an anamolous or erratic behavior may be due to the behavior of the complexes which form with quebracho. For example, it was found that for concentrations of quebracho of 5 pounds per barrel the filtrates from the aqueous suspensions were turbid when the NaOH concentration was 2 pounds per barrel or higher, and the results for Ca^{++} were erratic (frequently about 1500 ppm) and not highly reproducible.

It is also well known that the apparent solubility (or dispersibility) of quebracho in the presence of $Ca(OH)_2$ is a function of the amount and ratio of NaOH to $Ca(OH)_2$. Consequently, it is reasonable to assume that the quebracho may form complexes with Ca^{++} or $Ca(OH)_2$ which, dependent upon the relative concentrations of NaOH and other components in the system, may be colloidally dispersed and pass through the pores of the filter paper or the filter cake formed from a drilling mud. In view of such possibilities much additional work will be required to amplify the effect of quebracho upon reactions of this type in aqueous suspensions or in a drilling mud.

Treatment of the bentonite suspension with NaOH and quebracho after contamination with $CaSO_4$ results in a system having viscosities and gel strengths appreciably lower than by pretreatment. Above pH 11 these properties are not sensitive to concentration of $CaSO_4$ (2-10 pounds per barrel) even with a low (1 pound per barrel) concentration of quebracho. The effectiveness of water-loss control by quebracho is, however, decreased by post-treatment.

For suspensions pretreated with NaOH and quebracho prior to contamination with $CaSO_4$ the conditions for maximum reduction in viscosity and gel strengths were dependent upon the extent of the contamination: (a) Without added $CaSO_4$, optimum effects from the treatment were achieved at pH 11 to 12 with small amounts (1 pound per barrel) of quebracho. High concentrations of quebracho may produce detrimental effects above pH 12.5 (b) With $CaSO_4$ in amounts of 0.5 to 1 pound per barrel the viscosity, gel strengths and water-loss values were as low or lower than achieved in the absence of $CaSO_4$ over a wide pH range (10-13) and particularly in the pH range 12.5-13. (c) Deleterious effects of $CaSO_4$ in amounts of 2 pounds per barrel or more are minimized by increase in pH and concentration of quebracho, but adverse effects may result from overtreatment at pH values 12.5.

No correlation was found between the physical properties of these suspensions and the composition of the filtrate. Increase in the concentration of $SO_4^=$ in the filtrate was shown to result from decomposition of any $CaSO_4$ present as a solid phase by treatment with NaOH and quebracho. In the absence of clay or quebracho the reaction of NaOH and $CaSO_4$ results in the formation of $Ca(OH)_2$ as a solid phase according to the equation

$$CaSO_4 + 2\,NaOH \rightarrow Ca(OH)_2 + Na_2SO_4$$

The extent of this reaction is a function of the amount of NaOH and of the concentration of $SO_4^=$ in solution. In the presence of clay and quebracho the $Ca(OH)_2$ formed by this reaction may react to form compounds or complexes with the clay or quebracho.

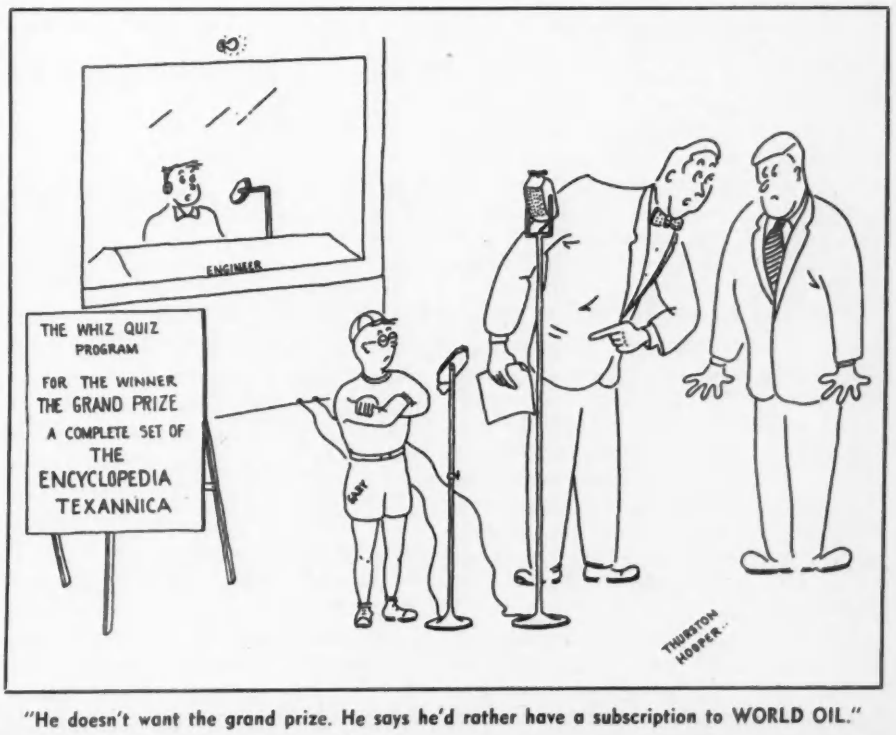
The Ca^{++} in the filtrates from the muds was shown to be a complex function of the concentration of $CaSO_4$ and quebracho. A rapid decrease in the Ca^{++} in the filtrate occurred at pH values 12.5 where the concentration of hydroxide ion increases so that the solubility of $Ca(OH)_2$ is exceeded.

REFERENCES

[1] V. E. Bergman and H. B. Fischer, Ind. Eng. Chem. 42, No. 9, 1895 (1950).

[2] O. Van Dyke and L. M. Hermes, Ind. Eng. Chem., 42, No. 9, 1901 (1950).

[3] A. Seidell, "Solubilities," Third Ed., Vol. I. pp. 240-347. D. Van Nostrand Company. New York. 1940.


ENGINEER
THE WHIZ QUIZ PROGRAM
FOR THE WINNER THE GRAND PRIZE A COMPLETE SET OF THE ENCYCLOPEDIA TEXANNICA
GUY
THURSTON HOOPER

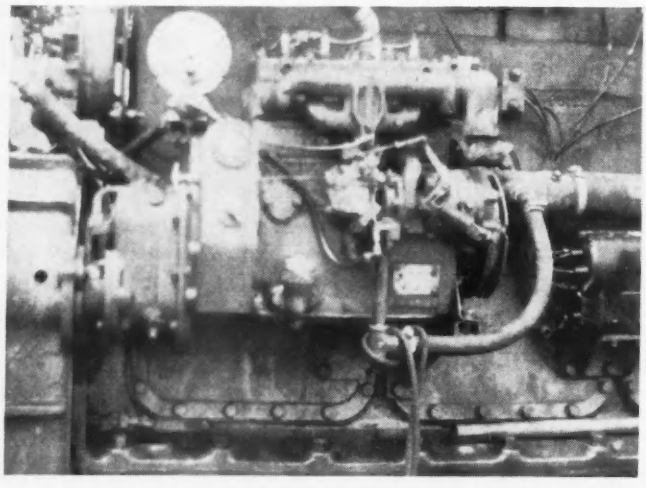
"He doesn't want the grand prize. He says he'd rather have a subscription to WORLD OIL."

How to do it!

DRILLING HINTS

$10 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas

Gas Starter Reduces Fuel Needs



Converting the starter engine, usually powered by gasoline, to the butane-natural gas used in the drilling engine removes one of the toolpusher's supply worries and eliminates need for an extra tank for the additional fuel.

A supply problem is created because the small starting engine is often the only equipment on location which requires gasoline for fuel. The gasoline tank attached to the engine is an ever-present source of annoyance since its vibration often loosens the anchoring brackets which then require constant tightening.

By converting from gasoline to butane-natural gas, a rig mechanic reports that the small engine will respond to one pull on the starter rope.

Conversion seemingly strengthened the engine horsepower rating and noticeably reduced lag when rotating a cold drilling engine. Furthermore, rigs stacked for months offered no starting problem following installation of the butane-natural gas system.

The first conversion step includes making a connection between the ounce regulator and fuel metering regulator for connecting a one-half inch garden or automobile heater hose. The hose is then attached to a low pressure regulator which is mounted where it can be adjusted with the left hand when the starting rope is pulled. Placing this regulator close to the engine carburetor is desirable.

Conversion of the gasoline carburetor is a simple matter. Carburetors with a one-eighth inch plugged side outlet permit simplest conversion practice. When removed, a small straight gas valve assembly or a 90-degree elbow gas adjustment with a three-inch nozzle can be installed. This accessory should be cut and fitted so gas will eject from the smallest part of the carburetor venturi. If the carburetor does not have the one-eighth inch pipe plug, a hole can be drilled and tapped through the side or bottom of the case so the load jet nozzle can be screwed in to reach the smallest part of the venturi. Small diameter hose or copper tubing is used to connect the gas valve assembly to the new regulator.

The installation is completed by connecting copper tubing to the one-eighth inch thread on the installed low pressure regulator and extending it to the center of the intake manifold. This acts as an idling line and also improves the engine performance. In operation, the engine has a tendency to miss-out at low, idling speeds; however, simple adjustment of the idling valve will immediately eliminate the problem. Since the starting engine seldom idles, special attention to the latter problem is insignificant.

The designer of this hookup reports finding a trick which will insure immediate engine starting with no difficulty. On up-draft carburetors, remove the air cleaner then fasten a five-inch length of radiator hose to the inverted cleaner stack with hose clamps. In case the carburetor is rigged with a side air intake, use a 90-degree hose of comparable length.

Wire Line Spool Is Handy Table

A large wire line spool serves as an excellent work table for rig mechanics. Whether in the field or shop, one mechanic reports that a large spool, preferably 3½ to 4½ feet in diameter, serves the purpose remarkably well since several people can work around it simultaneously. Complete utility of the spool is possible since even the hub recess is useful for cleaning putty knives.

Constructed of heavy, laminated lumber sections, the spools will support weighty loads and the work surface is a convenient distance from the floor or ground.

Measure The Work Your Line Has Done and Avoid Wasting or Overloading

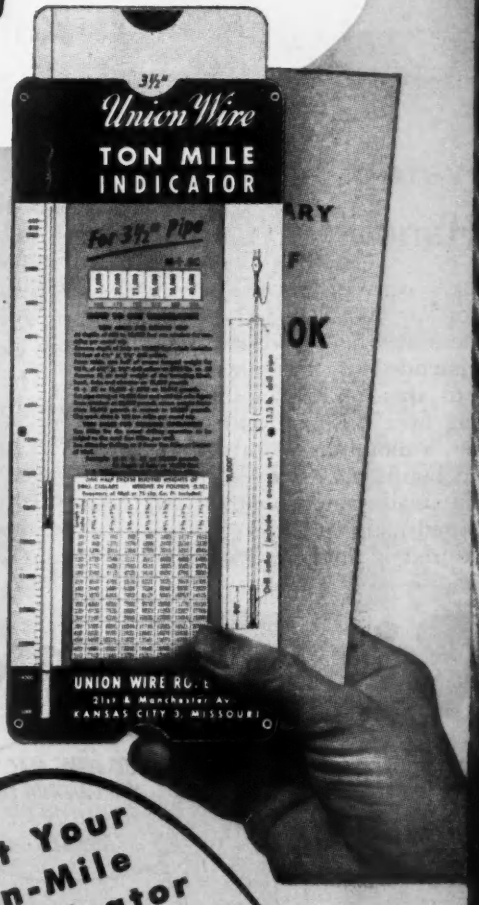


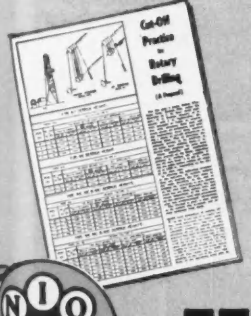
Figure Ton-Mileage With This Free Union Wire Ton-Mile Indicator

Now, many drillers are coming up with the better wire rope performance and lower wire rope costs which rig owners have been demanding. By using the Union Wire Ton-Mile Indicator, they are establishing the correct time for cutting off on each hole. This enables them to avoid cutting the line too soon or too frequently which wastes rope. And, it enables them to prevent overloading and the resulting line breaks and costly fishing jobs. And, they have found out which rotary line delivers the most ton-miles.

The Union Wire Ton-Mile Indicator is easy to use. Merely set the figures from your well log book on the indicator. It does all the complicated figuring for you. You read the answer. Easy as that!

Get Your Ton-Mile Indicator Now!

Oil Journal Editorial Features Proposal For Cut-off Practice In Rotary Drilling



The information in this article is based upon a 3 year research study covering 4 major oil regions. It discloses the waste in haphazard practices and guides drillers in setting up *Definite Cut-off Procedure* which will result in many more ton miles of service and save money on wire rope.

Send Coupon For A Reprint Of This Proposal

union Wire Rope

MAIL THIS COUPON

UNION WIRE ROPE CORPORATION

Specialists in Wire Rope

2104 Manchester Ave. Kansas City 3, Mo.

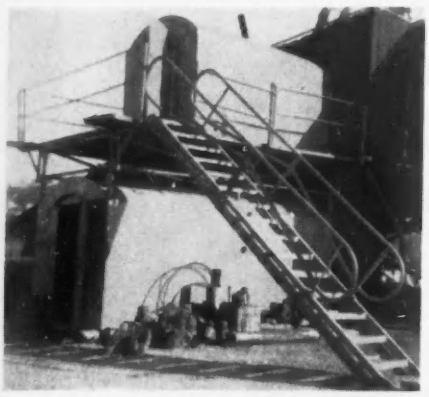
Gentlemen:

- ☐ Please have your field man deliver my Union Wire Ton-Mile Indicator and explain its use.
- ☐ Send reprint of Cut-off Proposal.

Name_____

Address_____

City_____ Zone_____ State_____



Elevated Toolhouse Is Handy for Crew

Where convenience and compactness of the toolshed and crewhouse are desired, the illustrated setup is recommended. By fastening pieces of pipe to the top of one house and flooring over the pipe with two-inch lumber, a mounting is formed for the second house. Removable safety rails can be made and mounted in the illustrated manner.

The unit is further streamlined by pivoting pipe supports for the side walkways. While the supporting platform remains on the ground level house for a rig move, the upper house is removed and lowered to the ground with the derrick line. The stairway and dual-door house permit easy access to the derrick floor.

Adjustable Support Holds Suction Hose

Under certain drilling conditions, it may be necessary to set the pumps a distance from the mud tank and install long suction hose segments. Supporting these sections can be done with adjustable equipment built of pipe in the form of a carpenter's saw-horse.

The legs of the supports are fitted with plate feet to prevent sinking into soft ground, while the cross member is rigged with an offset lug as a lock for ordinary link chain The chain is attached to the cross-piece with a loop which leaves the entire length of

chain hanging free. Inserting the chain in the loops, welded to the suction piping, and bringing the free end through the lock will support the piping at the desired height. The position is locked by slipping the link of chain into a slot cut in the loop adjacent to the cross member, then giving the free end of the chain a couple of turns on the cross member to prevent the link from slipping out of the locking slot.

Rig Runner

the automatic drilling report

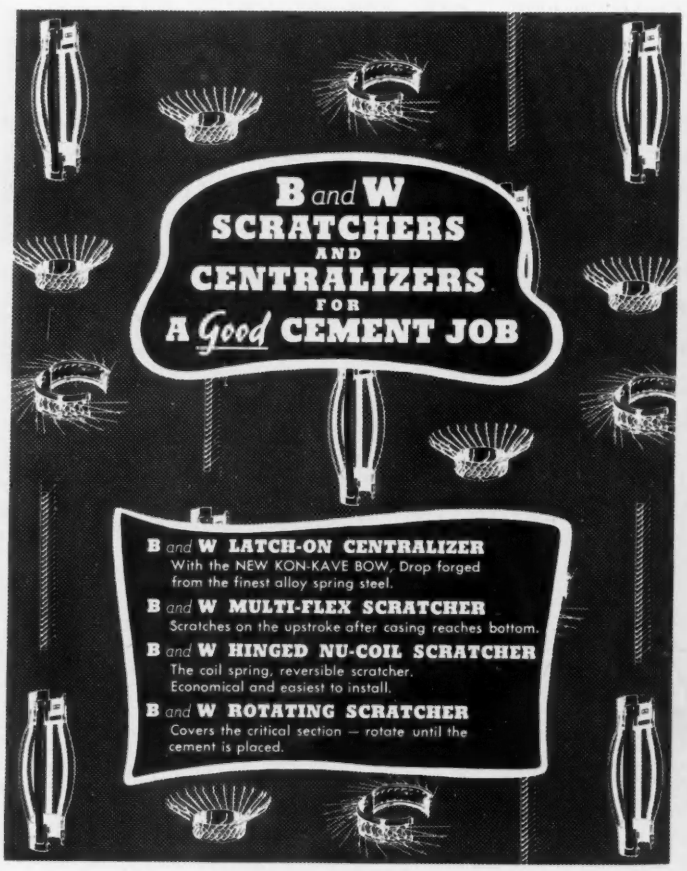
More and more drillers, when changing tours, are "running their swabs" from the Rig Runner chart. Toolpushers diagnose trouble . . . drilling time is recorded for geologists . . . all from the Rig Runner chart. More and more customers are finding the exact breakdown of drilling costs with Rig Runner, the only fully automatic recorder of every rig operation. Write now for proof that this sensational instrument actually saves operators and contractors thousands of dollars a year per rig!

"The Traveling Block Tells the Story"

WARREN AUTOMATIC TOOL CO.

1920 Hussion Street, Houston, Texas

Manufacturers and Distributors of Mud-O-Graf and Pit-O-Graf


B and W SCRATCHERS AND CENTRALIZERS FOR A Good CEMENT JOB
B and W LATCH-ON CENTRALIZER
With the NEW KON-KAVE BOW, Drop forged from the finest alloy spring steel.
B and W MULTI-FLEX SCRATCHER
Scratches on the upstroke after casing reaches bottom.
B and W HINGED NU-COIL SCRATCHER
The coil spring, reversible scratcher. Economical and easiest to install.
B and W ROTATING SCRATCHER
Covers the critical section — rotate until the cement is placed.

GULF COAST
P. O. Box 5266
Houston 12, Texas
WE-ntworth 6603

B and W Incorporated
Well Completion Specialists

WEST COAST
3545 Cedar Avenue
Long Beach 7, Calif.
Long Beach 4-8366

Thompson DOES

Double Duty

in OIL FIELDS!

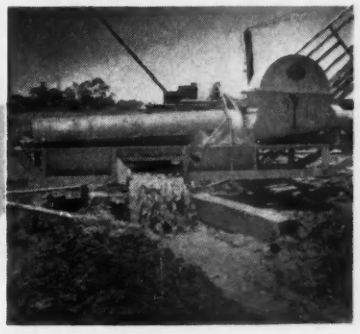
SHALE SEPARATOR & SAMPLE MACHINE

For economy alone, no drilling outfit should be without a Thompson. Thompson does a double duty job and does it better: (1) by removing destructive shale and abrasives from your drilling mud, it saves you money because unnecessary wear and tear on costly drilling equipment is reduced to a minimum, and (2) the Sample Machine (standard equipment on all Thompson Separators) gives an accurate analysis of the progress of the well by collecting foot-by-foot cuttings. Each Thompson Separator is designed around the self-motivated principle, which activates the separator by the mud flow. Yes, once you see a Thompson, you will make it a part of your standard drilling equipment.

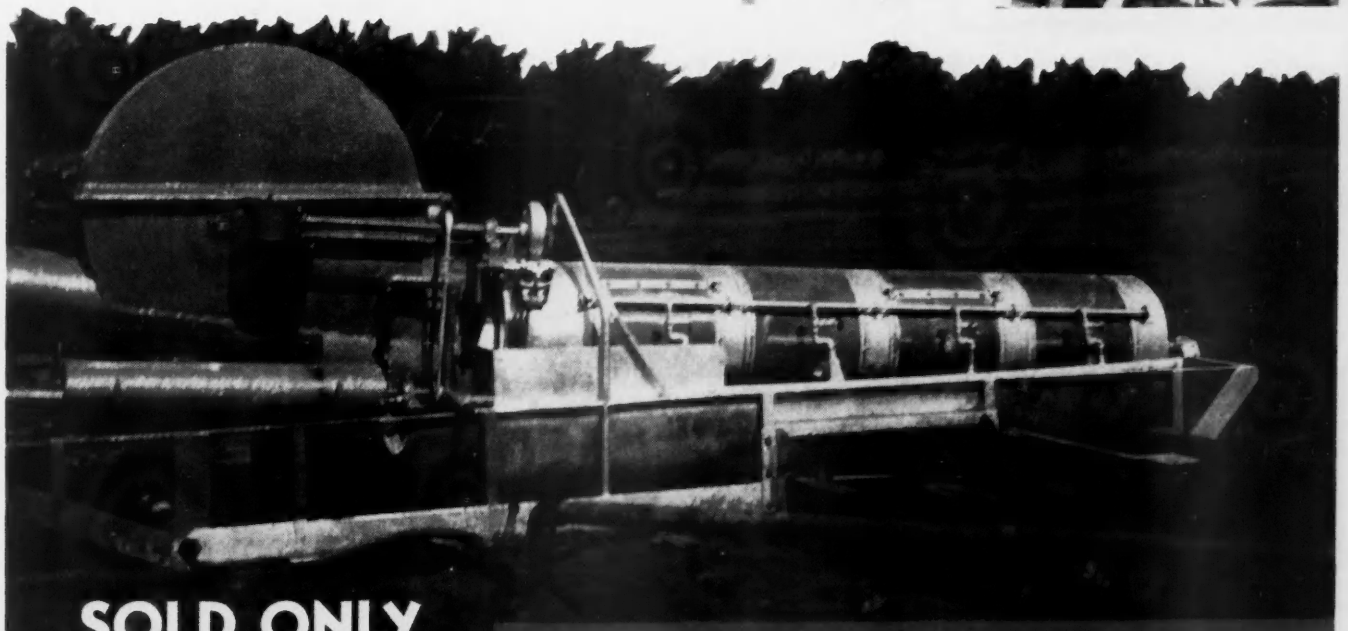
★ PROVEN PERFORMANCE
★ ECONOMICAL OPERATION
★ SAVES DRILLING COSTS

Thompson SEPARATORS ARE EASILY TRANSPORTED ★

Thompson SEPARATORS WILL TAKE HEAVIEST MUD FLOW ★



Thompson SAMPLE MACHINE GIVES ACCURATE SAMPLES ★



SOLD ONLY THROUGH SUPPLY STORES

Thompson TOOL CO.
IOWA PARK, TEXAS

ONAN Oilfield
Electric Plants

CK MODELS
3,000 watts, A.C.
5,000 watts, D.C.

HEAVY-DUTY PORTABLE & STATIONARY MODELS
Diesel, Gas, Gasoline-powered

●ONAN oilfield electric plants provide dependable light and power for oil field applications. A complete range of A.C. and D.C. models... all conservatively rated for continuous, dependable service helps you choose the right plant for the job. Lightweight, air-cooled models from 400 to 5,000 watts; heavy-duty, water-cooled, gas-gasoline-driven plants from 5,000 to 35,000 watts. Air-cooled Diesel electric plants 2,500 watts. Water-cooled Diesels from 12,500 to 55,000 watts, powered by IH engines.

Write for Literature
D. W. ONAN & SONS INC.
5970 University Ave., Minneapolis 14, Minn.

Cut Costs

SAND-BANUM
REMOVES AND PREVENTS BOILER SCALE AND CORROSION

Use Ounces Only Once A Week
for more power . . . less fuel . . . longer equipment life . . . reduced down time.

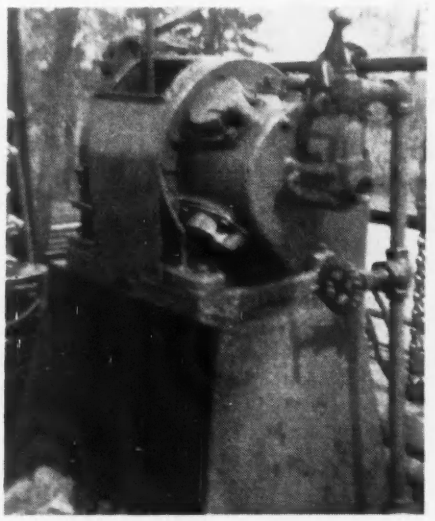
SAND-BANUM SPECIAL
TABLETS REMOVE AND PREVENT RUST AND SCALE IN ALL RADIATOR COOLING SYSTEMS
for economy and efficiency in Diesel Rigs and in trucks.
Stocked by Leading Supply Houses

AMERICAN SAND-BANUM CO.
Established 1926
9 Rockefeller Plaza
New York 20, N.Y.

Air Hoist Replaces Cathead

A portable air hoist, designed primarily for other industrial usage, will eliminate the hazard of cathead operation for bringing singles of drill pipe or casing to the derrick floor. Possibly one of the most hazardous operations on the floor, catheading has taken a terrific toll among rig personnel operating the equipment.

Athough automatic controls aid in reducing cathead accidents, the fact remains that often a crewman will cathead the derrick line with no one at the drawworks control panel. In the event the rope fouls and catches the crewman, serious injury is the result.



Because of the potential hazard peculiar to the drawworks cathead, an operator installed a lightweight, inexpensive air hoist on the floor for handling singles of tubular goods. The capacity of the unit is sufficient to handle drill collars and, of course, the kelly.

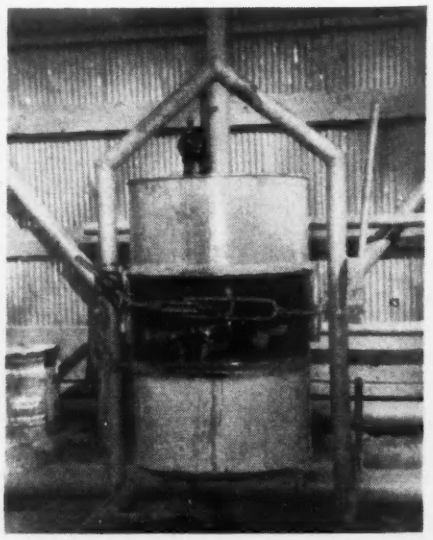
Operating on air furnished by the rig compressor system, the air hoist should be located where the operator can view the pipe rack and derrick floor. With this plan in force, the operator can watch the crewman tailing-in pipe and also have a clear view of the rig floor. Installation of a heavy duty air hoist virtually eliminates a need for catheading the derrick line.

Drum Rack Reduces Oil Waste

One of the worst eyesores around a rig is an accumulation of oil drums. The practice of using makeshift racks leads to waste which can be avoided with a simple, inexpensive rack.

A convenient rack for mounting and tipping oil drums can be made from pieces of discarded pipe, a section of chain, plus a good welder. The drum cradle is bolt suspended between the pipe uprights. One bolt is fastened to a length of rod which can be locked in three different positions. Any number of these racks can be mounted on a platform, making a neat, compact and easily movable bank of lube drums.

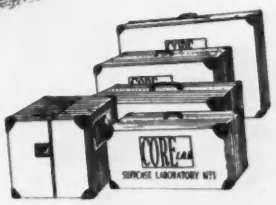
Aside from offering an economic advantage, these unitized racks promote better safe working conditions around a rig. The practice of 'manhandling' full drums to pour out lubricant can easily result in serious injury to the employe. In addition, placing heavy oil drums on hurriedly constructed wooden racks can be hazardous since there is the ever prevailing possibility that the drums might fall from such flimsy structures.



Make one call do it all!

ON-LOCATION CORE ANALYSIS

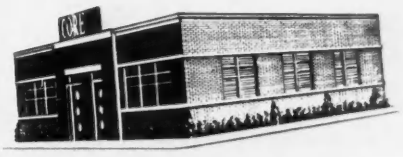
STATION WAGON CORE ANALYSIS



SUITCASE CORE ANALYSIS

FROZEN CORES

SIDE WALL CORE ANALYSIS

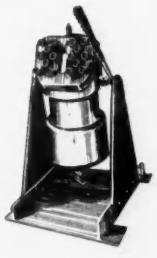


OFF-LOCATION CORE ANALYSIS

WELL LOGGING (on-shore)

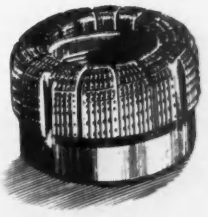
WELL LOGGING (off-shore)

WELL SAMPLING



RESERVOIR FLUID ANALYSIS

ENGINEERING STUDIES



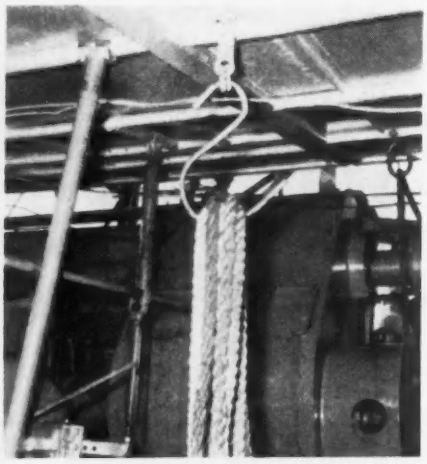
DIAMOND CORING RENTAL SERVICE

CORE LABORATORIES, INC. ● **IN ALL ACTIVE AREAS**

Dallas, Houston, Corpus Christi, Midland, Abilene, San Antonio, Tyler, Wichita Falls, Lubbock, and Post, Texas; Oklahoma City, Oklahoma; Great Bend, Kansas; Shreveport, Lafayette and New Orleans, Louisiana; Natchez, Mississippi; Bakersfield, California; Denver, Colorado; Worland, Wyoming; El Dorado, Arkansas; Farmington, New Mexico; Calgary and Edmonton, Canada; Venezuela, S. A.

CORE LAB

PETROLEUM RESERVOIR ENGINEERING



Simple Care Extends Life of Soft Rope

One secret of catline care is proper hanging and storage. Although the line is subjected to strenuous service in the rig, worse damage is often inflicted by improper coiling or hanging.

To prevent kinking and tearing line strands, one operator J-bolted a tong chain swivel to an engine shed diagonal support and cold-shut an S-type, one inch iron rod hanger to the lower swivel eye. In function, the S-type hanger will rotate 360 degrees to eliminate establishing damaging kinks when storing the heavy catline.

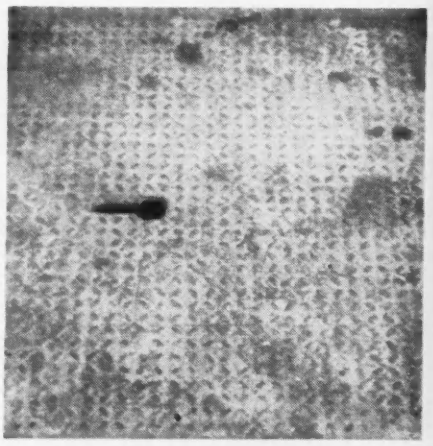
The installation is quite simple, will expedite hanging the catline and will definitely insure longer rope work life in the derrick.

Keyhole Assists in Lifting Floor Plate

Simplicity, low cost, and practicality are advantages offered by this simple means of lifting floor plates from the working surface of drilling substructures for rig moving or for access to equipment.

The hob-surfaced steel plating commonly used for such flooring can be extremely difficult to handle unless there is an easy way to attach the lifting line. Eye bolts, holes for hooks and similar methods are objectionable because they interrupt the floor.

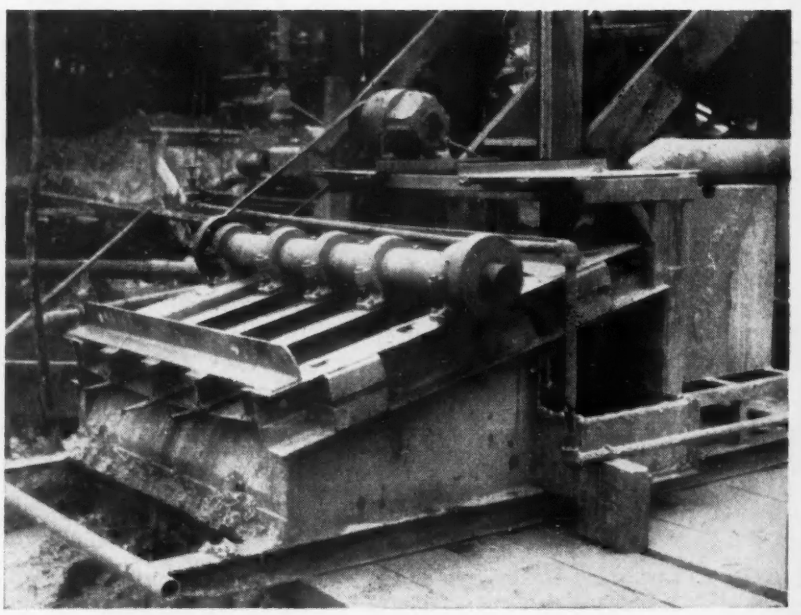
There is no such difficulty with the



simple method of lifting floor plates shown, which consists of a keyhole-shape cut in the plate. Through the keyhole, a link or two of chain can be inserted and engaged in the slot. On small plates which require only one lifting point, the hole should be located so that the off-center weight will keep the chain engaged. For large plates, two holes—one at each end—should be provided with the slots facing each other, to allow the sling-chain to be self-tightening.

Screen Cloths last more than a year.

ITS RUMBA ACTION
REMOVES SAND AND SHALE BY NEW FLOTATION PROCESS



"RUMBA" Shale Shakers excel in performance and low cost maintenance. They come to you completely unitized on 10 ft. skids . . . no rigging up costs in the field. The underslung screen cloth, with no obstructions on the bottom, removes sand by floating it out on the bottom of the cloth. This design contributes to the longer screen cloth life . . . one of the features that is causing the worldwide demand for "RUMBA" Shakers.

HUTCHISON MANUFACTURING CO.
6609 AVENUE U • HOUSTON 11, TEXAS

. . . and that really describes the job of

the JOHNSTON Open Hole Tester today.

Proved in thousands of tests, the Johnston Open Hole Tester is stretching the short supply of casing into the largest number of producers, because it tells you the productive possibilities of your well **before** you set casing.

Stretch your casing into the right hole — call Johnston when it is time to test. Experienced representatives operate in all active areas twenty-four hours a day.

JOHNSTON TESTERS, INC.

5702 NAVIGATION BLVD. • HOUSTON, TEXAS

SERVICE BRANCHES IN ALL ACTIVE AREAS

There's a Johnston Service Representative Near You

FORMATION AND CASING TESTING — JOHNSTON

PULL FASTER and EASIER

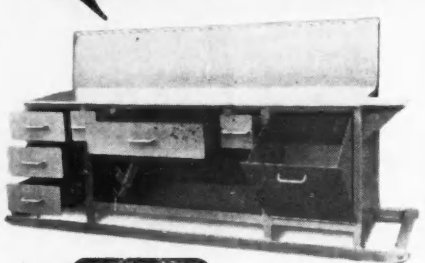
Simplex Center-Hole Jennies use hydraulic power for quicker pulling of valve seats, gears, wheels—scores of other oil field jobs. Operate in any position; light weight, quickly set up. 6 models: 30 to 100 ton Capacities.

Simplex LEVER • SCREW • HYDRAULIC Jacks

Send for Bulletin: Oil 49

TEMPLETON, KENLY & COMPANY
1032 South Central Avenue, Chicago 44, Illinois

YOUR BEST BUY IN WORK BENCHES



OWEN

. . . *standard of the industry*

These outstanding, all-steel work benches are now manufactured exclusively by Beacon Mfg. Co. Built to the same rigid specifications as set by "Whitey" Owen, they're still the best buy possible in oil field tool and work benches.
BUY OWEN Work Benches . . . manufactured by Beacon . . . through your supply store. Two sizes, to fill all requirements, are available.

L&H MACHINE WORKS
2205 Quitman Houston, Texas
EXPORT: Baird Supply Co., Inc.
420 Lexington Ave., New York, N. Y.

Trolley Carries Heavy Loads

The job of handling heavy equipment is made easier by a simple chain hoist trolley frame built over the loading dock. Fabricated of discarded pipe, the welded structure includes three-inch reinforced main members and one-inch strap iron end-guides. The chain hoist is anchored to a roller yoke suspended from a six-inch H-beam. The H-beam track is topped with welded metal squares perforated to guide U-bolts which clamp around the structure roof spreaders.

In operation, the chain hoist will travel from end to end on the frame. Hence, it is possible to handle heavy loads on the platform with comparative ease. Utility of the structure is further demonstrated by the fact that engine repair will be simplified by placing the power plant under the frame. The chain hoist will then be handy to pull heavy blocks and handle parts removed from the engine.

Although the structure appears to be cumbersome and bulky, it does not present any problem in transport since it is possible to load small equipment on the truck bed below the chain hoist trolley structure.

For greater convenience, the structure should be placed in the immediate vicinity of the derrick floor so, after heavy equipment has been removed from a truck, it can be maneuvered to the floor with the derrick line.

Structural cost is reasonable, and the unit will show pay-out by faster handling of heavy equipment and reduced possibility of personnel injury.

Complete Equipment • Efficient Service

Pictured is one of our heavy-duty oil field hauling trucks. Over 24 years experience guarantees you fast, efficient hauling service.

HELDT TRUCKS

Fully Bonded • Fully Insured

HELDT BROS., *Trucks*

ALICE Phone 1376 | FREER Phone 2511 | SULLIVAN CITY Phone 11

Submersible Drill Barges-

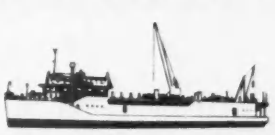
"A COMPLETE PACKAGE"

BY Levingston

From crown block to barge bottom, Levingston is prepared to accept the entire responsibility of constructing and rigging-up your submersible drill barges, on a turn-key basis. You select the tools, or equipment, and Levingston's experienced organization will install them for safe and efficient operation on marine locations.

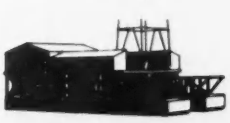
LEVINGSTON BUILDS FINE SPECIALIZED MARINE EQUIPMENT FOR THE PETROLEUM INDUSTRY

Non-self propelled oil well drilling tenders—converted LST's



Drilling barges converted from navy seagoing barges.

Self-propelled oil well drilling tenders—converted Lst's

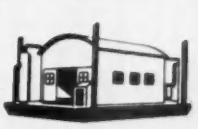


Submersible drill barges

Vessels for geophysical exploration

Crew boats

Boiler and power barges



Compressor barges

Water, oil and supply barges

Levingston

SHIPBUILDING COMPANY • ORANGE, TEXAS

Tugs

SLASH..

DRILL COLLAR REPLACEMENT COSTS

It will pay you many times over to investigate Lone Star's improved, automatic process of building up drill collars.

By shipping drill collars to the Lone Star plant for build-up, you profit 2 ways:

(1) You gain assurance of uniform, faultless workmanship which can be attained only at the plant . . .

(2) You pay less. Lone Star's process is materially faster, therefore less costly.

Write today for complete information.

LONE STAR ★ TOOL COMPANY

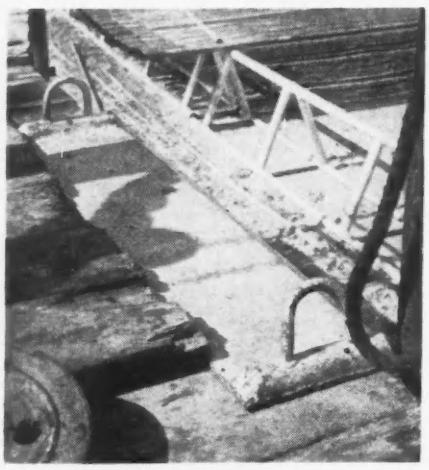
WICHITA FALLS, TEXAS

Removable Roller Racks Drill Pipe

It is easier to lay down drill pipe and there is less possibility of damage to the pipe when a roller or similar bumper is installed on the ramp directly beneath the window.

A roller which is easily removed after each such operation is used by one drilling contractor.

To either end of the part of the ramp that lies on the rig floor was welded a loop of sufficient size to permit inserting a length of 3½-inch drill pipe. This length of pipe, acting



as a roller, has point contact on the convex surfaces of two short pieces of two-inch pipe that are welded to the floor plate and to the tops of which are welded the loops.

When not in use, the roller is slipped out and laid aside. The loops also simplify lifting and loading the ramp when the rig is moved.

Bar Retainer Used To Pick Up Engine

By burning 1½-inch holes in the radiator support, it is possible to guide a lift bar through the perforations for ease in hanging these heavy units. Since most engines are permanently fastened to beam skids and seldom require moving off a unit, the installation of metal hooks and eyes is unnecessary. However, if it is necessary to move the engine off of a unitized skid, it is often difficult to find a secure, safe fastening member below the radiator. Under the circumstances, truckers are often tempted to

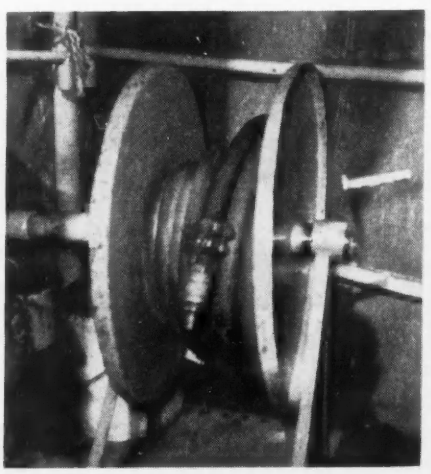
fasten a chain around one of the more fragile engine components.

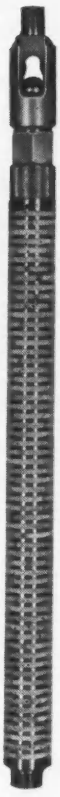
The bar retainers are not objectional since they do not project nor do they offer any possibility of stumbling or like hazards.

Simple Spool Saves Water Supply Hose

A handy reel for storing the washdown hose is simple and inexpensive to make by welding two round sheets of steel to a piece of pipe which connects to the water supply with a swivel joint. The unit can be mounted on a stand consisting of a base plate, four angle legs and two short sections of pipe. A hose connection is mounted in the pipe between the two disks.

This piece of equipment is not only a safety aid by keeping loose hose off the derrick floor, but also encourages good housekeeping around the rig. Proper spooling of the hose also eliminates the possibility of kinks developing and, in this manner, service life of the hose will be materially increased.





For Rod or Tubing Pumps

Pulling too often - - - - - - ?
Costly pump repairs - - - ?
Lost production - - - - ?

INSTALL

√ Martin Plungers
√ Martin Cages

Hundreds of Operators have checked and double checked on that.

Designed for the job They do the job.

Sold thru your supply company.

Field representatives:

E. W. Brockman, Tel. 7-7477, Tulsa
Don C. Davis, Tel. Wilson 8055, Ft. Worth
Tom Hulett, Tel. 3-4545, El Dorado, Ark.
L. K. Martin, Tel. 2-5317, Corpus Christi
J. L. Davis, Tel. MOhawk 4891, Houston

JOHN N. MARTIN
MANUFACTURER
9 W. Brady St., Tulsa, Okla. Tel. 4-9415

when you use

GEOLOGRAPH

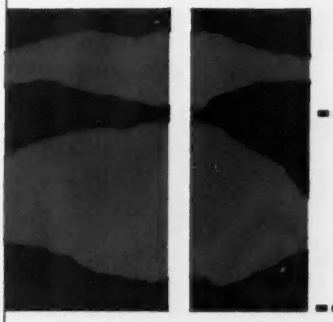
Yes sir — the job is done better and faster when all 3 tours are properly informed. That's why good drillers appreciate the completeness of the Geolograph record. This information encourages the kind of teamwork which makes the most hole *at the least cost per foot!*

GEOLOGRAPH
MECHANICAL WELL LOGGING SERVICE
P.O. Box 1291 • Oklahoma City 1, Okla.

ABILENE, HOUSTON, ODESSA, LUBBOCK & WICHITA FALLS, TEXAS
BAKERSFIELD, CALIF. — SHREVEPORT & BATON ROUGE, LA.
CASPER, WYOMING — GLENDIVE, MONT. — STERLING, COLO.
OKLAHOMA CITY, OKLA.

the answers to lost circulation

2 *two products*



QUEENSEAL

QUEENSEAL, for control of abnormal and large circulation losses, is PRICED COMPETITIVELY with other bulk additives on the market.

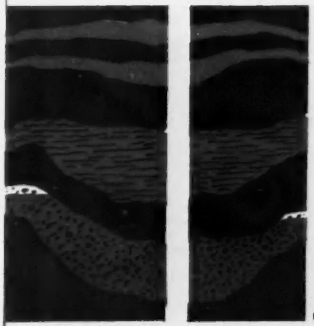
QUEENSEAL is constructed of processed inert wood fibers, strong pliable textile fibers, and resilient selected particles of white pine sawdust. These ingredients interlace and mesh, forming a most effective and permanent lock.

QUEENSEAL is packaged in slightly damp form to eliminate deterioration and pulverization under hydraulic pressure, retaining its original effective form.

Requires no change in the drilling fluid.

Can be used in any type of clay base mud, oil emulsions, and oil base mud.

Is immune to chemical action and bacterial deterioration.



KINGSEAL

KINGSEAL, for control of normal and small circulation losses, is a highly engineered product basically consisting of Wool, Cotton, Jute, Synthetic Fibers (Rayon and Nylon), and Sawdust of a varied particle size. These ingredients lock together forming a felt-like, tailored plug within the formation.

KINGSEAL does not form a "wall scab", so easily dislodged by the running in and out of a tool, but seals from within, retaining a strong permanent seal.

Requires no change in the drilling fluid.

Can be used in any type of clay base mud, oil emulsions, and oil base mud.

Is immune to chemical action and bacterial deterioration.

For further information contact:

HOME OFFICE
THE WILLIAM E. SIEVERS CORP.
2875 Cherry Ave., Long Beach 6, Calif.
Phones: 4-4247 — 9-7636 (Night)

SIEVERS COMPANY
Box 3084, Odessa, Texas
Phones: Odessa 6-3682 — 2-2290 (Night)
4718 Bell, Houston, Texas

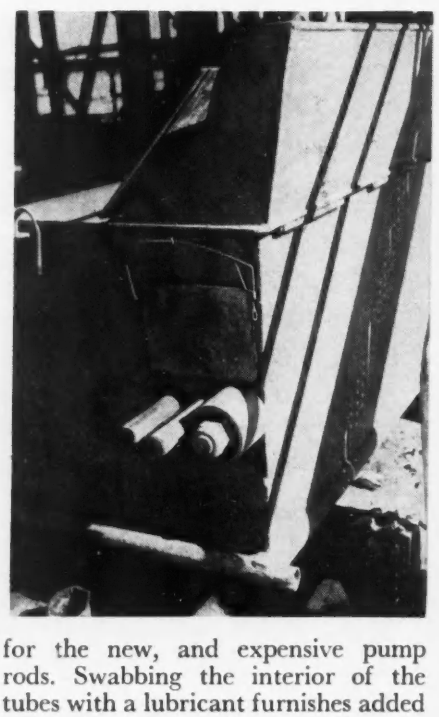
JAMES E. EMRICK CO.
Casper, Wyo. Phones: 5266 — 4894 (Night)
or
Your Favorite Mud Company In
Louisiana, Texas, New Mexico

Pump Rods Stored In Special Niche

The steel tool box used to store wrenches and light equipment can be fitted with an additional compartment for the storage of highly polished piston rods, extension taps and comparable accessories. Three tubes of different diameters, inserted through holes cut in each end of the tool box, will accommodate varied rods and taps.

Further protection is afforded by sheet metal doors over the tube openings. Each door is rigged with hinges and a wire handle sufficiently long to hook on the top surface of the tool bench.

Designed as illustrated, these storage compartments insure protection



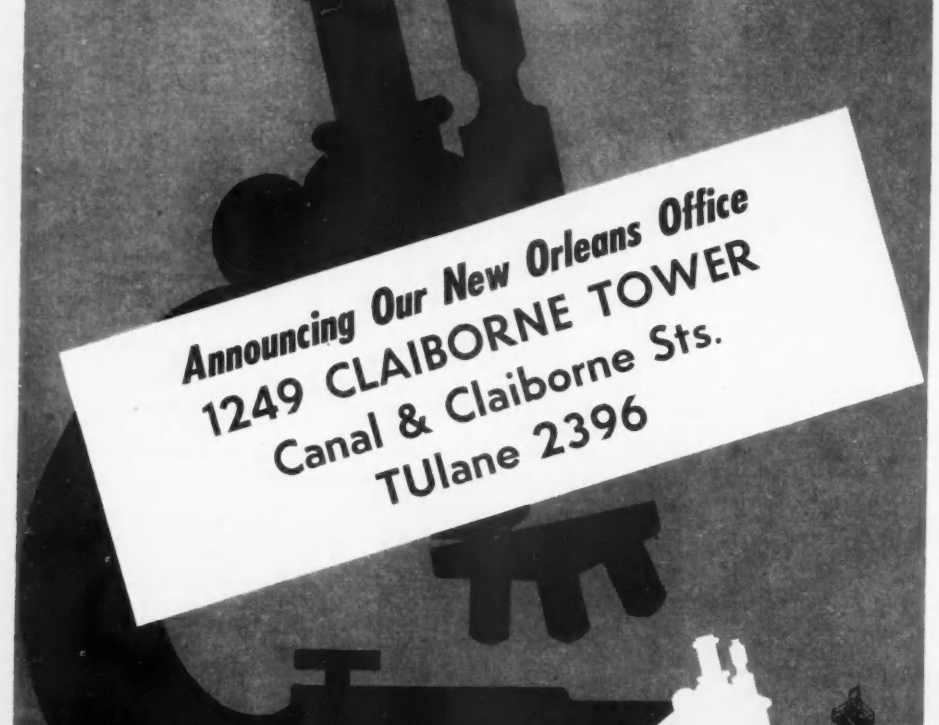
for the new, and expensive pump rods. Swabbing the interior of the tubes with a lubricant furnishes added protection by retarding corrosion.

Encasing Tong Spring Means Added Safety

To eliminate the danger of a whipping tong pull-back spring and at the same time provide protection for the spring, an operator devised an enclosure for the spring as shown.

The length of three-inch pipe used for the enclosure is bolted to the derrick floor sill in a vertical position with suitable brackets. A pulley is welded to the top of the pipe for the tong line.

The length of the three-inch pipe is determined by the spring length and the maximum travel of the spring which would ordinarily amount to about 15 feet. The dead end of the spring is merely held in place with a bolt passed through holes cut near the bottom end of the pipe. Three or four sets of holes at six-inch intervals will allow for some adjustment for desired spring tension without the necessity of adjusting the tong line length.



WELL LOGGING BY ANALYSES OF MUD AND CUTTINGS
CORE ANALYSIS • RESERVOIR ENGINEERING
GEOLOGICAL LOGGING CO.
2711 CROCKER • JAckson 7759 • HOUSTON 6, TEXAS

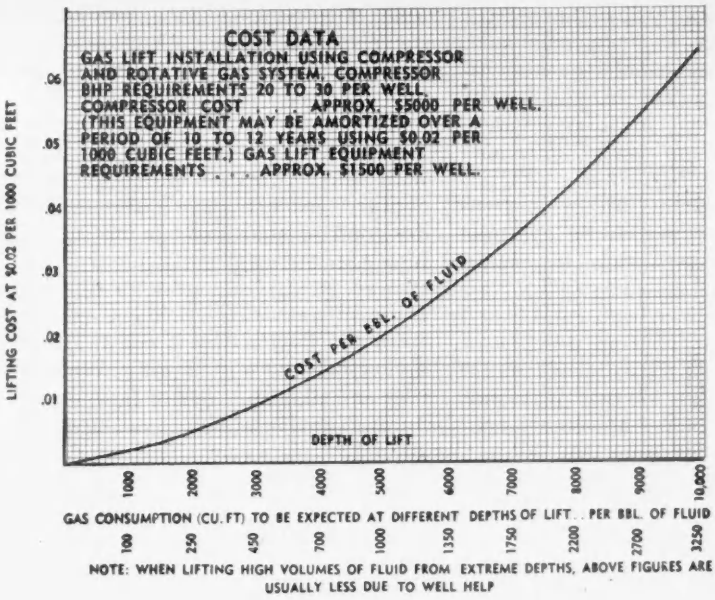

COST DATA
GAS LIFT INSTALLATION USING COMPRESSOR AND ROTATIVE GAS SYSTEM. COMPRESSOR BHP REQUIREMENTS 20 TO 30 PER WELL.
COMPRESSOR COST APPROX. $5000 PER WELL. (THIS EQUIPMENT MAY BE AMORTIZED OVER A PERIOD OF 10 TO 12 YEARS USING $0.02 PER 1000 CUBIC FEET.) GAS LIFT EQUIPMENT REQUIREMENTS . . . APPROX. $1500 PER WELL.
LIFTING COST AT $0.02 PER 1000 CUBIC FEET
.06
.05
.04
.03
.02
.01
COST PER BBL. OF FLUID
DEPTH OF LIFT
1000 2000 3000 4000 5000 6000 7000 8000 9000 10,000
GAS CONSUMPTION (CU. FT) TO BE EXPECTED AT DIFFERENT DEPTHS OF LIFT . . PER BBL. OF FLUID
100 250 450 700 1000 1350 1750 2200 2700 3250
NOTE: WHEN LIFTING HIGH VOLUMES OF FLUID FROM EXTREME DEPTHS, ABOVE FIGURES ARE USUALLY LESS DUE TO WELL HELP

FIGURE 1.

Simplified calculations and examples of gas lift installations for five basic types of wells solve most lifting problems.

By E. D. McMURRY
Garrett Oil Tools, Inc., Houston

Application of Gas Lift To Everyday Production Problems

Part 1

MODERN gas lift, when properly applied, is an efficient and economic method of lifting fluid from subsurface levels. Its use is so flexible and so widespread that it is now one of the leading methods of artificial lift. When considering the use of gas lift, the following factors should be evaluated and analyzed: (1) Were completion methods such that gas lift can be properly applied to deplete the wells? (2) Will there be available at all times a source of gas for lifting purposes? (3) Will it be necessary to compress the gas, or is it available from a high-pressure gas well? (4) What will be the cost of the gas, and, in turn, the anticipated lifting cost per barrel of fluid? (5) If it is necessary to compress the gas, will the initial investment in equipment by comparable to other methods or artificial lift?

Any type of oil-producing reservoir may be depleted with modern gas lift unless the completion method was such that proper application of gas lift equipment is impossible. However, gas lift can be applied properly under a vast majority of completion methods. It is particularly adaptable in producing to depletion the following types of wells: (1) Wells with active water drive. (2) Wells that produce abrasive fluids. (3) Wells that produce high gravity, gassy fluids. (4) Wells with crooked holes. (5) Wells located on offshore platforms.

Gas lift is being used in wells that produce as little as three or four barrels daily, and in wells producing as high as 20,000 barrels daily. The greater the depth of lift, the more apparent will be the benefits of gas lift under normal producing conditions. Gas lift is being used where static pressures are as low as 30 pounds per square inch and can be used even where a vacuum is pulled on the formation.

In the past, many gas installations have been removed simply because high-pressure gas for lifting became unavailable. When considering gas lift for the depletion of a reservoir, long range planning should be done in order to assure an ample supply of gas during the life of the wells. Should it be necessary to compress the gas, the initial investment cost in equipment, plus the lifting cost per barrel, can be estimated. The cost curve (Figure 1) will be helpful in determining these costs insofar as gas lift compressor systems are concerned.

Types of Gas Lift Valves

The most widely used type of gas lift valve is commonly referred to as a "pressure charged" gas lift valve. This type of valve, in its various modifications, is adaptable to every type of producing well. Examples of such valves are illustrated in Figures 2, 3, 4, and 5. In actual operation, this type of gas lift valve functions much as an ordinary back-pressure regulator, with surface control provided through the medium of high-pressure gas in the casing. Since this type of valve is so widely accepted, this article will be limited to its application under various well conditions. In most applications, the valves are mounted on tubing mandrels (Figure 6) and are used with reverse flow check valves (Figure 7.)

Types of Wells

In modern gas lift there are five basic types of wells that constitute

about 99 percent of all production problems. The remainder can be classed as being special or uncommon. Taken separately, most producing oil wells can be classified under one of the following types:

1. High bottom-hole pressure and high productivity index.
2. High bottom-hole pressure and low productivity index
3. Low bottom-hole pressure and low productivity index
4. Low bottom-hole pressure and high productivity index
5. Dually-completed wells.

In designing gas lift installations for these types of wells, the most important data, other than the size of the tubing and casing, depth of well, etc., are: productivity index of the well and static bottom-hole pressure. The productivity index is a key to the type of installation required and, in turn, the type of pressure-charged gas lift valve to use.

The static bottom-hole pressure indicates the location of the upper valve. Spacing of additional valves in the tubing string can be determined from the spacing formula, (Figure 8) originated by the author in 1946 and widely accepted as logical base information from which to obtain proper spacing data. The factor "F" in this formula has been established through study of a large number of flowing pressure tests under actual gas lift conditions. While it is not represented as being absolutely correct under all conditions, this "F" factor has been found to be a good base from which to work.

High Bottom-Hole Pressure and High P.I. Wells

Usually, this type of well is capable of producing in excess of 300 barrels of fluid daily. Any well with a normal bottom-hole pressure and a productivity index of 0.50 or better will fall into this classification. This type well is ideally suited for lifting with the "constant flow" pressure-charged gas lift valve. This valve is designed so that gas can be injected into the tubing string (or casing string) in varying volumes but at a constant rate. The delivery of fluid from the flow string is constant with a very minimum of surging. With this type installation, rates of flow may be varied from relatively small up to extremely large values. This type of gas lift installation can be produced against a surface fluid choke to assist in regulating the necessary fluid volume. It is common practice to control the injected gas for this installation by tubing pressure control. When the tubing pressure falls below a predetermined setting, gas is admitted into the casings. With this arrangement, no outside gas is consumed should the well begin to flow naturally. Figure 9 illustrates a pressure control hookup of this type. Normally, each valve in the string is equipped with a reverse flow check valve.

In this type of well, the flowing bottom hole pressure is usually greater than the injected gas pressure and a tubing packer is not actually required. However, a packer is ordinarily used in order to stabilize the fluid level in the casing and to divert all formation gas into the tubing string.

The number of gas lift valves required for a well of this type, can be determined as shown in the following example:

Total Depth: 5000 feet.

Static Pressure: 1800 psi.

Static Fluid Level: 500 feet.

Productivity Index: 1.

Maximum Fluid Desired: 400 barrels daily.

Tubing Size: 2".

Casing Size: 5½" O.D.

Separator Pressure: 50 psi.

Gradient of Well Fluid: 40 psi.

First step is to plot the static pressure curve "A" shown in Figure 10. From the spacing formula, it is

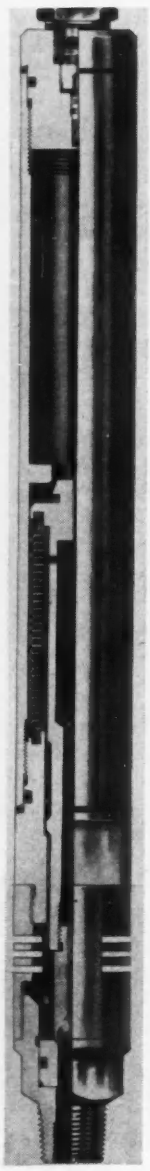


FIGURE 2. Small port intermitting valve.

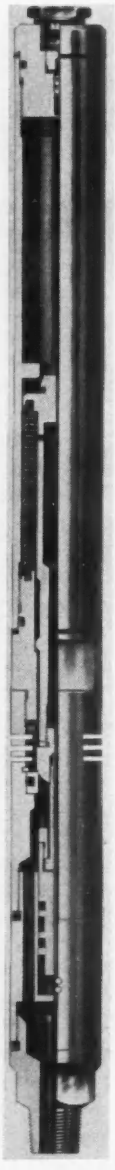


FIGURE 3. Large port intermitting valve.

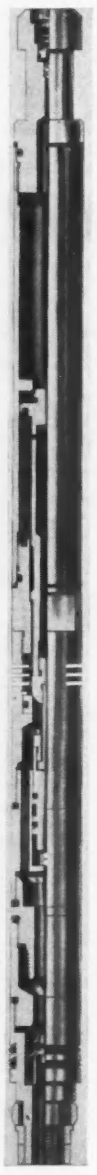


FIGURE 4. Wire Line retrievable intermitting valve.

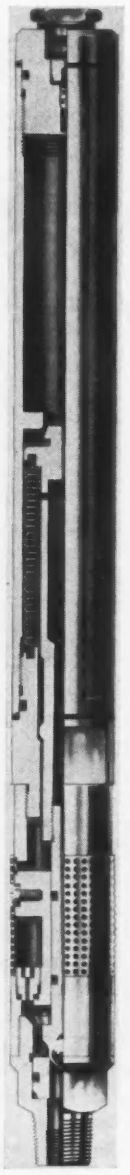


FIGURE 5. Constant flow valve.

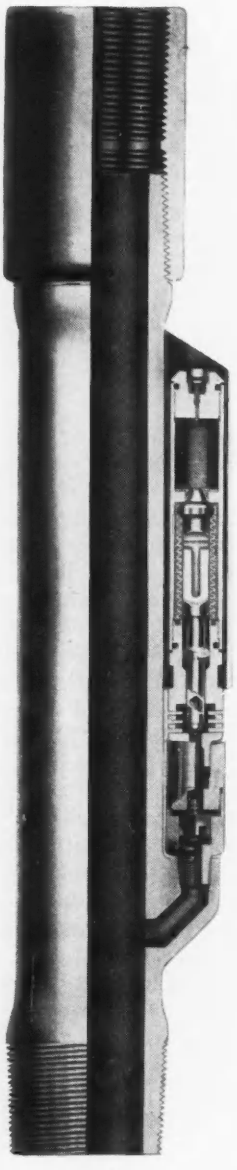


FIGURE 6.

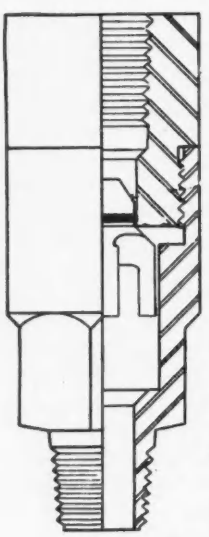


FIGURE 7. Reverse flow check valve.

AXELSON sucker rods

Axelson has manufactured for the Petroleum Industry since 1892 and has pioneered the scientific development of petroleum pumping equipment. Take sucker rods, for example . . .

AXELSON WAS

first **to use vanishing threads**

first **to study and improve the curve of the upset ends into the body of the rod**

first **to use nickel-molybdenum steel**

first **to normalize and temper the rods throughout their entire length**

Today, this policy of constant technical research, even more intense, assures highest standards of quality in scientific design, on long lived materials and precision craftsmanship—and is the answer to why it is . . .

AXELSON *Chosen first . . . TO LAST!*

PETROLEUM PUMPING EQUIPMENT

OUR 60th YEAR

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

Ⓐ

AXELSON MANUFACTURING CO.
OFFICES — New York City 7, New York
Tulsa 1, Oklahoma
Buenos Aires, Argentina

PLANTS — Los Angeles 58, California; St. Louis 16, Missouri. DISTRIBUTORS — Jones & Laughlin Supply Co.; Great Northern Tool & Supply Co.; Industrial Agencies, Ltd., San Fernando, Trinidad, B. W. I.; Industrias Waldrip & Campbell, Barcelona, Caracas and Maracaibo, Venezuela; South American Supply Co., Ltd., Lima, Peru; Sociedad Comercial de Materias Primas Limitado, Rio de Janeiro, Brazil; G. Saavedra e Hijos, S. de R. L. Avenida Morelos 31, Mexico, D. F.; Dominion Oil Field Supply Co., Ltd., Calgary, Can.

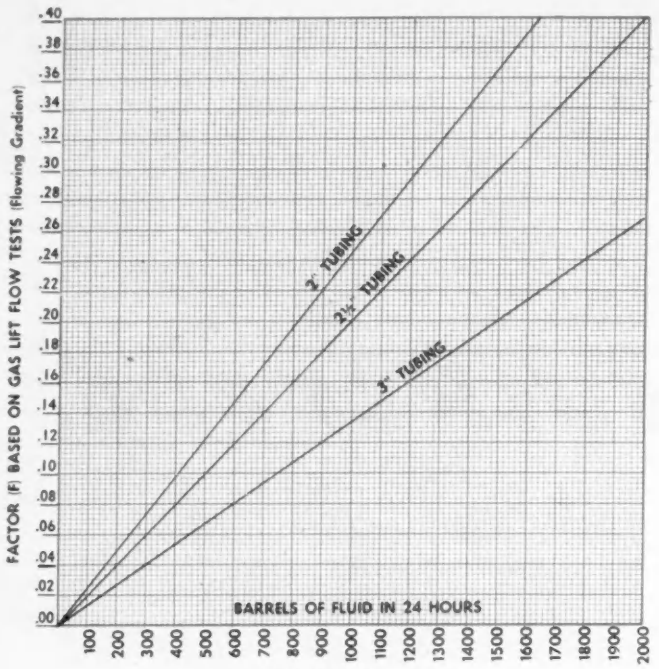


FIGURE 8.

SPACING FORMULA

To space No. 1 valve from surface:

$$\frac{\text{Available pressure}}{.50} = \text{distance in feet from surface to No. 1 valve}$$

NOTE: If fluid level is lower than this figure, install No. 1 valve at fluid level.

Space all other valves as follows:

$$\frac{\text{Valve pressure} - \text{Separator pressure} - (\text{Depth} \times \text{Factor})}{.50}$$

EXAMPLE:

Available pressure: 650 psi
Four valve installation
2½" tubing
200 barrel well
Factor: .04 (See Graph, Figure 8).
Separator pressure: 25 psi
Valves set at 600 psi, 575 psi, 550 psi, 500 psi.

To space No. 1 valve:

$$\frac{650}{.50} = 1300 \text{ feet from surface to No. 1 valve}$$

To space No. 2 valve:

$$\frac{600 - 25 - (1300 \times .04)}{.50} = 1046' \text{ spacing} = 2346 \text{ feet from surface to No. 2 valve}$$

To space No. 3 valve:

$$\frac{575 - 25 - (2346) - .04}{.50} = 912' \text{ spacing} = 3258 \text{ feet from surface to No. 3 valve}$$

To space No. 4 valve:

$$\frac{550 - 25 - (3258 \times .04)}{.50} = 790' \text{ spacing} = 4048 \text{ feet from surface to No. 4 valve}$$

NOTE: Static gradient of .50 is used in the above formulae simply to assure that the installation will handle heavy salt water with ease.

It is common practice not to space pressure, operated valves less than 400 feet apart, regardless of the above formulae. However, in large volume fluid wells (300 barrels daily or more) it is suggested that the formulae be followed until the space reaches only 200 feet between valves. One of the most common errors made in installation design is the tendency to space the valves too wide apart.

found that when gas lifting at the rate of 400 barrels daily inside two-inch tubing, it is reasonable to assume a flowing back-pressure of .10 psi per foot, or 100 psi per thousand feet of depth. Under the condition shown, with a separator pressure of 50 psi, it is again reasonable to assume a tubing pressure of approximately 100 psi when the well is producing. By plotting the curve "B", which indicates the assumed flowing pressure of the well at 400 barrels daily, the necessary sand face pressure drop required to obtain the 400 barrels of fluid daily is established. Under the assumed well condition, a 400 psi drop is required to obtain the 400 barrels, since the productivity index is 1. This drop can be obtained by gas injection at approximately 2400 feet, and theoretically this is as deep as the lowermost valve should be placed. It is common practice to run one or possibly two extra gas lift valves below this depth as insurance against incorrect well data and possible bottom-hole pressure decline. By plotting curve "C," the necessary injection pressure is determined. This curve should be plotted so that 80 to 100 psi operating differential is always available. Plotting curve "D"

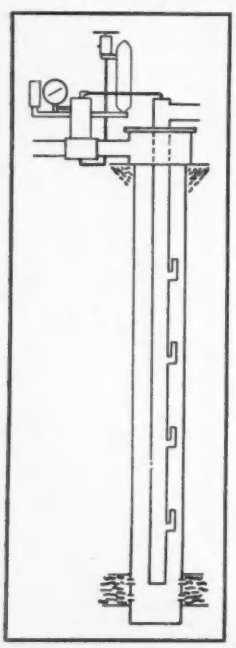


FIGURE 9.
Pressure-control gas-lift hookup.

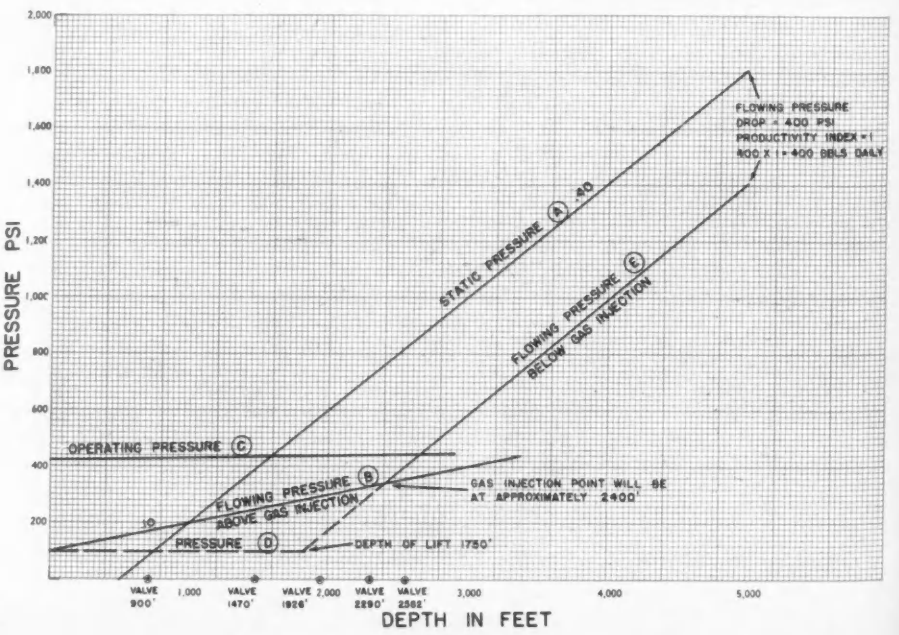
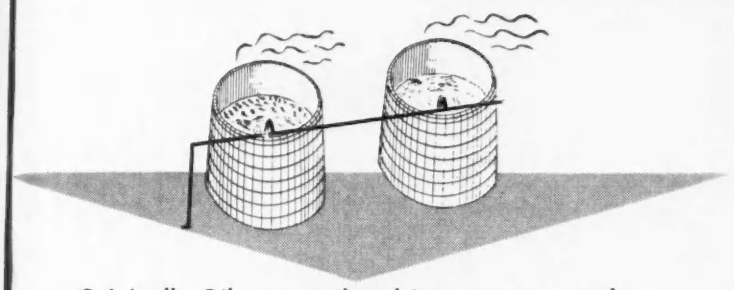
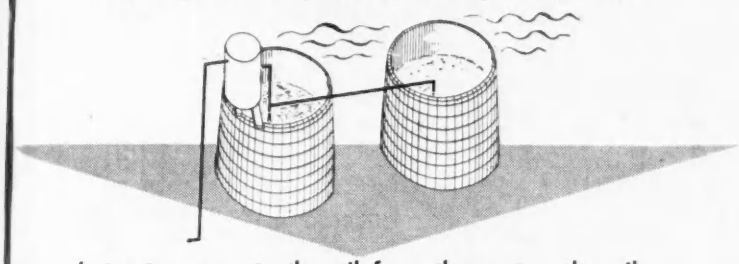


FIGURE 10.

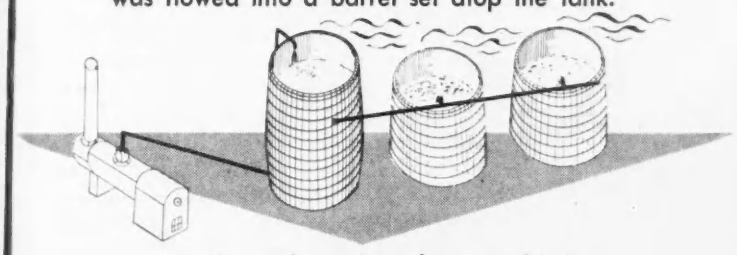
EVOLUTION OF OIL TREATING



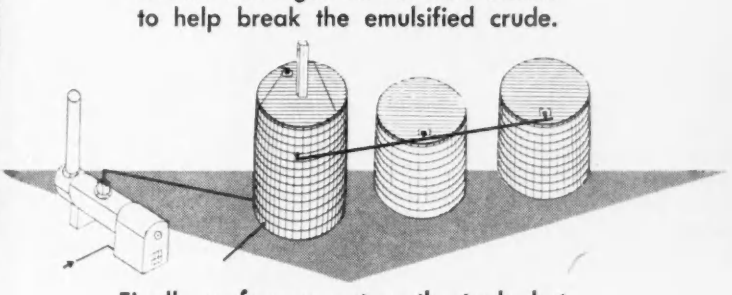
Originally Oil was produced into open top tanks.



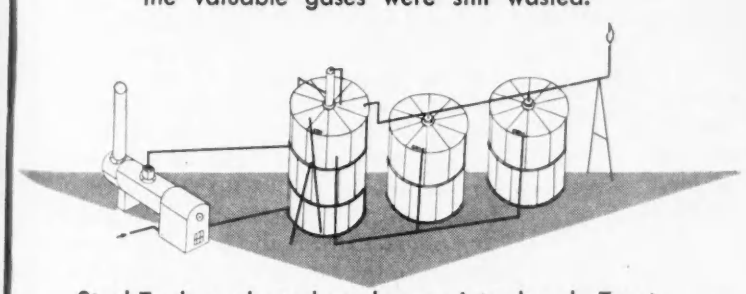
Later to separate the oil from the water, the oil was flowed into a barrel set atop the tank.



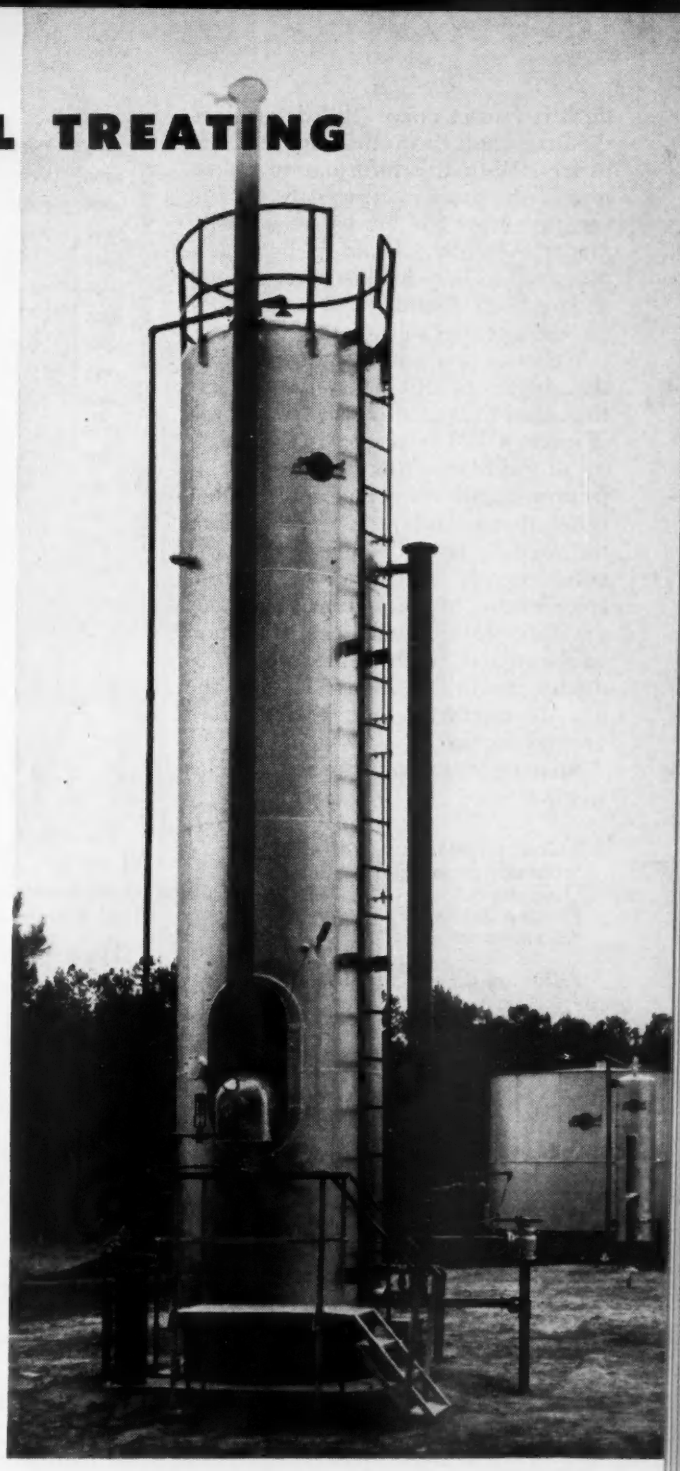
A boiler and gun barrel were added to help break the emulsified crude.



Finally roofs were put on the tanks but the valuable gases were still wasted.



Steel Tanks and gun barrels were introduced. Treating efficiency increased but great waste continued.



Today, National Treaters embody greatest water reduction efficiency; conservation of condensibles and in addition, include low pressure separation facilities in the top compartment.

National Treaters are solving the problems of producers throughout the world. National Emulsion Treaters are available for every known type of oil. With a National you are assured of efficient, economical, trouble-free treating.

It's a National

NATIONAL TANK COMPANY

TULSA, OKLAHOMA

REGISTER and VOTE—it's YOUR country

until it crosses curve "E" determines the maximum theoretical depth of lift in feet. With this information, selection of the proper orifice sizes for the constant flow gas lift valves is easily made. Actually, Table 1 has been prepared to help in this selection and it has been found very satisfactory for the average well of this type.

Under actual producing conditions, the depth of lift is normally less than that indicated by the flow graph (Figure 10). The reason is the gradient of fluid below the point of gas injection usually is reduced somewhat in relation to the static gradient since the well is now flowing. Thus, the actual depth of lift can be reduced considerably by this action. The input gas/fluid ratio should be in relation to the actual depth of lift under producing conditions. Figure 11 gives the gas requirements for lifting from various depths.

Spacing data for this well are as follows:

Kickoff pressure required:	450 psi.
Separator pressure:	50 psi.
Fluid desired:	400 bbls. daily
Flowing Factor "F"	.10 psi.
All valves set at	425 psi.

Following the spacing formula (Fig. 8):

$$\frac{450}{.5} = 900 \text{ (Feet to top valve)}$$

$$\frac{425-50-(900\times.10)}{.5} = 570 \text{ (Feet to next valve)}$$

Space #2 valve at 1470 feet

$$\frac{425-50-(1470\times.10)}{.5} = 456 \text{ ((Feet to third valve)}$$

Space #3 valve at 1926 feet

$$\frac{425-50-(1926\times.10)}{.5} = 364 \text{ (Feet to fourth valve)}$$

Space #4 valve at 2290 feet

$$\frac{425-50-(2290\times.10)}{.5} = 292 \text{ (Feet to fifth valve)}$$

Space #5 valve at 2582 feet

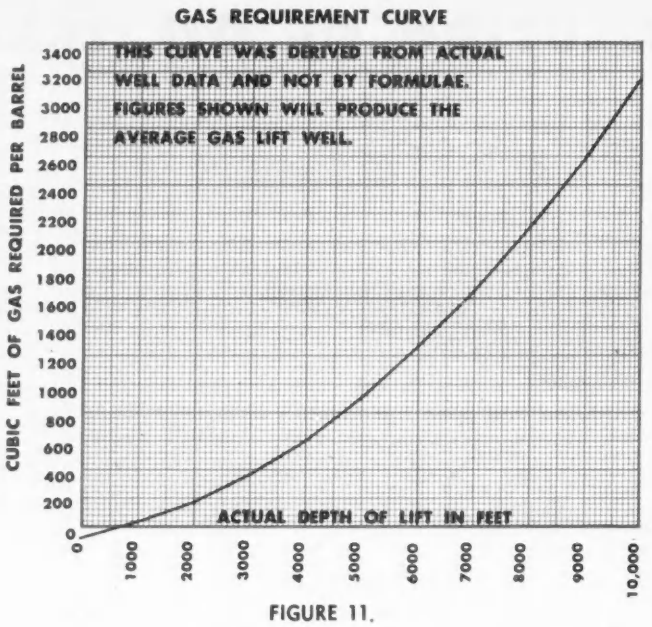


FIGURE 11.

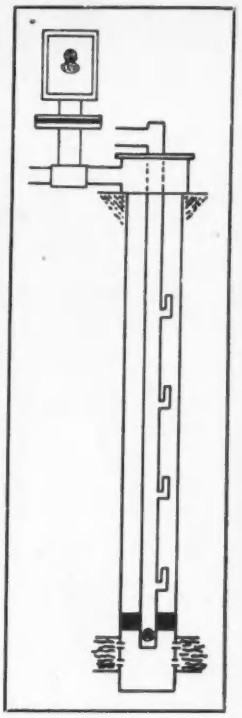


FIGURE 12.

This type of well is the easiest of all to gas lift, with the cost of gas usually one cent or less per barrel of fluid produced.

High Bottom-Hole Pressure and Low P.I. Wells

This type of well usually has a maximum producing capacity of less than 300 barrels of fluid daily. For gas lifting, they are ordinarily equipped with small port, intermitting gas lift valves which are surface controlled by a time-cycle intermitter at the wellhead. Fluid is produced intermittently as "slugs," in relation to the capacity of the well. Figure 12 shows a typical gas lift installation for this type of well, and Figure 13 is a production chart made by such a gas lift installation.

The gas lift valves used in this application are so designed that there is a known "spread" in pressure from the open to the closed position. This is commonly referred to as the "Back Pressure Factor," and is designated as —0, —5, —10, —15 and —20. Actually, this factor simply means that a valve unbalanced—15 (or 15 percent) will spread approximately 15 percent of the pressure differential which exists between the tubing and casing at the time the valve is opened. For example. If a —15 valve opens at 500 psi, with 300 psi in the tubing it will close at 470 psi (30 psi "spread") or 15 percent of the 200 psi differential that orginally existed. Care must be taken to select the valve with the proper spread in relation to the size of the casing and tubing. This will assure that the spread of the valve does not consume an excess of gas with each head of fluid produced. A table for selection of the "back pressure factor" for different sizes of casing and tubing is shown in Table 2.

All intermitting gas lift valves should be equipped with reverse flow check valves to eliminate all possibility of back wash through the lower valves in the tubing string. The check valves also allow circulation of fluid with the valves in the hole. A packer should always be used with an intermitting gas lift installation in order to stabilize the fluid level in the casing. Highest efficiency cannot be obtained unless the fluid level is stabilized.

To design a gas lift installation for this type of well, these conditions will be assumed:

TABLE 1

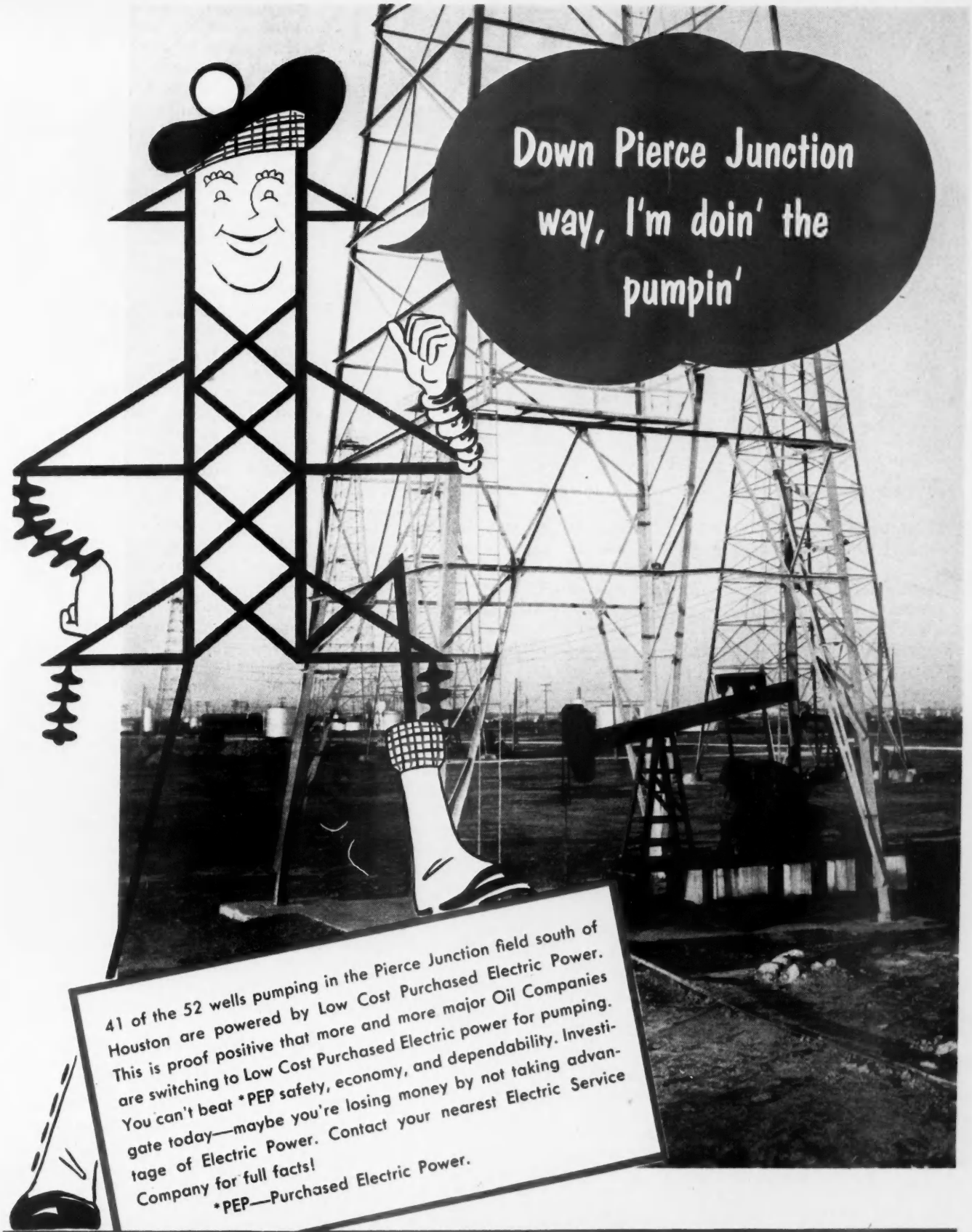
The "constant flow" valve is equipped with three positive replaceable chokes behind the main port. For maximum efficiency, the orifice sizes of these chokes should be as follows:

Bbls. Fluid Per Day	Size Tubing	Number and Size Chokes In Each Valve
150 to 250	2″	One 5/64″; two blank
250 and over	2″	One 6/64″, two blank
250 to 500	2½″	One 6/64″, two blank
500 to 1500	2½″	One 7/64″, two blank
1500 and over	2½″	One 8/64″, two blank

When "constant flow" valves are to be used as intermitting unloading valves they should be equipped with three 6/64 inch chokes, or three 7/64 inch chokes or three 8/64 inch chokes, whichever are available.

TABLE 2

Casing Sizes (Inches)...	9⅝; 8⅝; 7	9⅝; 8⅝; 7	5½	5½	5
Tubing Sizes (Inches)...	2	2½	2	2½	2
Back Pressure (Factor)..	—0 or —5	—0 or —5	—5 or —10	—10 or —15	—15 or —20



41 of the 52 wells pumping in the Pierce Junction field south of Houston are powered by Low Cost Purchased Electric Power. This is proof positive that more and more major Oil Companies are switching to Low Cost Purchased Electric power for pumping. You can't beat *PEP safety, economy, and dependability. Investigate today—maybe you're losing money by not taking advantage of Electric Power. Contact your nearest Electric Service Company for full facts!

*PEP—Purchased Electric Power.

Petroleum Electric Power Association

ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY

CALL YOUR NEAREST ELECTRIC SERVICE COMPANY FOR MORE FACTS

OR ADDRESS YOUR REQUEST TO P. O. BOX 2771, DALLAS, TEXAS

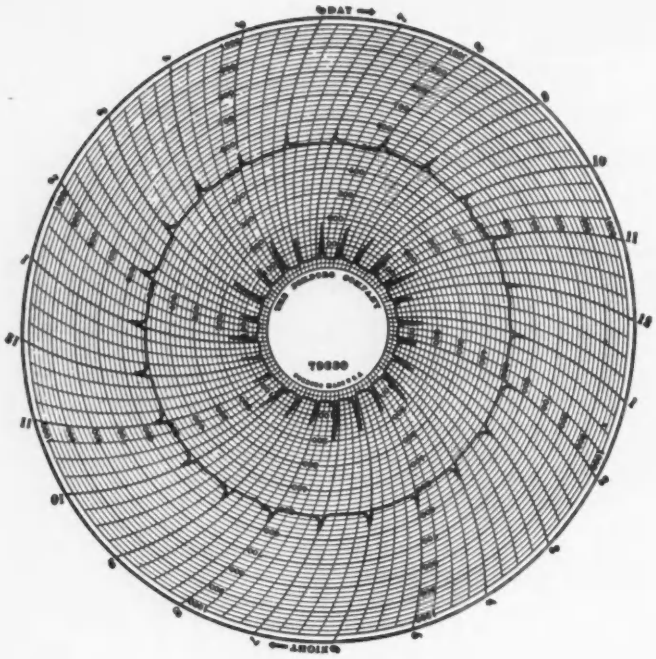


FIGURE 13.

Total depth of well: 5000 feet.

Static bottom hole pressure: 1400 psi.

Static fluid level: 1500 feet.

Productivity index: 0.10.

Fluid desired: Full well capacity.

Tubing size: 2".

Casing size: 5½" O.D.

Separator pressure: 50 psi.

Gradient of well fluid: 0.40.

It is felt that little if any benefit is gained by producing a well with a sand face pressure drop greater than 60 to 80 percent of the static pressure. Flowing bottom-hole pressure tests and personal observation tend to substantiate this statement. From all indications, as a sand face pressure drop exceeding 50 percent of static pressure occurs, apparently there is a rapid decrease in the amount of fluid which can be obtained with each additional pound of sand face pressure drop. The productivity index curve of each well will no doubt vary considerably but, according to the author's experience, does not remain a straight line. In view of these observations and beliefs, this installation will be based on an 80 percent drawdown.

Maximum producing capacity of the assumed well = $1400 \times .80 = 1120 \times .1 = 112$ barrels per day.

With reference to the spacing formula, the flowing back-pressure inside two-inch tubing at 112 barrels per day is assumed to be approximately .03 psi per foot, or 300 psi per 1000 feet. Adding to this the 50 psi separator pressure, the static curve "A" and then the flowing curve "B" is plotted on the flow graph (Figure 14).

Curve "B" will indicate the depth necessary to run gas lift valves in order to create 1120 psi sand face drop. Here again, if this lowermost valve is not at the bottom of the tubing string, it is safe practice to run one or two additional valves to insure against incorrect well data or decline in bottom-hole pressure. Curve "C" indicates the operating casing pressure required for intermitting gas lift operations. It is good practice to have approximately 100 psi injection gas pressure for every 1000 feet of lift, maintaining this ratio until a pressure of 700 psi is reached. Only on rare occasions do intermitting gas lift wells require more than this maximum figure. On intermitting gas lift wells, the point of gas injection is usually accepted to be the depth of lift, as very little help is obtained from the formation gas. Under the assumed conditions, the depth of lift is 4800 feet.

The spacing formulas for this installation are identical with that previously described, except that the top valve would be placed at 1500 feet (Figure 8).

Valve Spread

Since operating pressure at the valves is 450 psi, it is reasonable to assume that the tubing pressure opposite the operating valve will not be less than 250 psi, at the time that valve is opened.

$$\frac{250 - 50 \text{ sep. Press.}}{.40} = \text{feet of fluid}$$

500 feet of fluid in 2-inch tubing = 1.94 barrels.

To lift 1:94 barrels from 4800 feet requires approximately 1.94×950 (Figure 11), or a total volume of 1843 cubic feet of gas.

The annular area between 5½-inch O.D. casing and two-inch tubing contains, on an average, 0.10 cubic foot for each foot of depth. Thus, $4800 \times 0.10 = 480$ cubic feet in the annular area.

$$\frac{1843}{480} = 3.8 \times 14.7 = 56 \text{ pounds}$$

spread required to give 1843 cubic feet of gas. The intermitting gas lift valves used in these installations are normally furnished with "back pressure factors" ranging as follows: —5, —10, —15 and —20. Either of these would be satisfactory under the conditions outlined, since none of them have an excessive spread under those conditions.

It is common practice to select a valve with a relatively wide spread, but one that does not use an excessive volume of gas, from the open to the closed position. In so doing, the casing annulus is used to some extent as a volume reservoir.

The method illustrated here is also used to design an installation where no productivity data is available. Valves are simply run to a depth of 60 to 80 percent below the static fluid level and spaced to handle the maximum fluid volume desired.

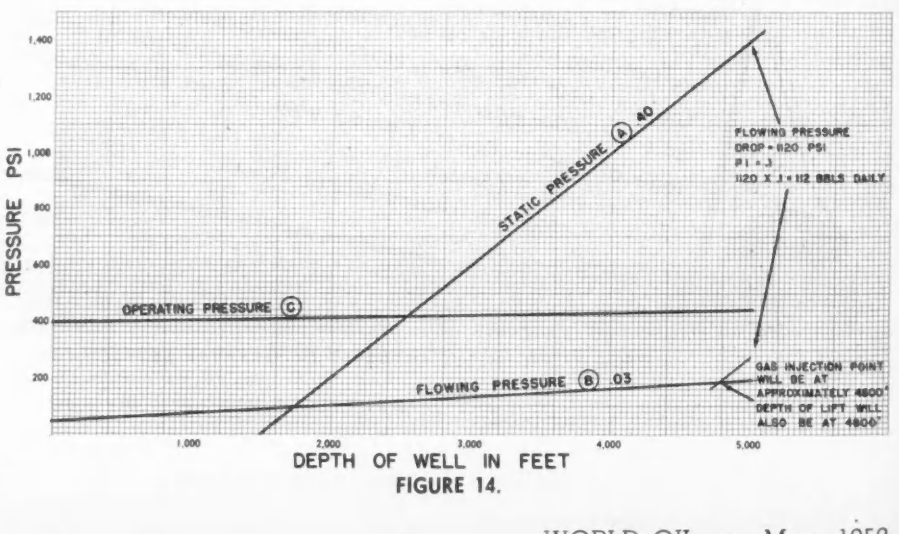
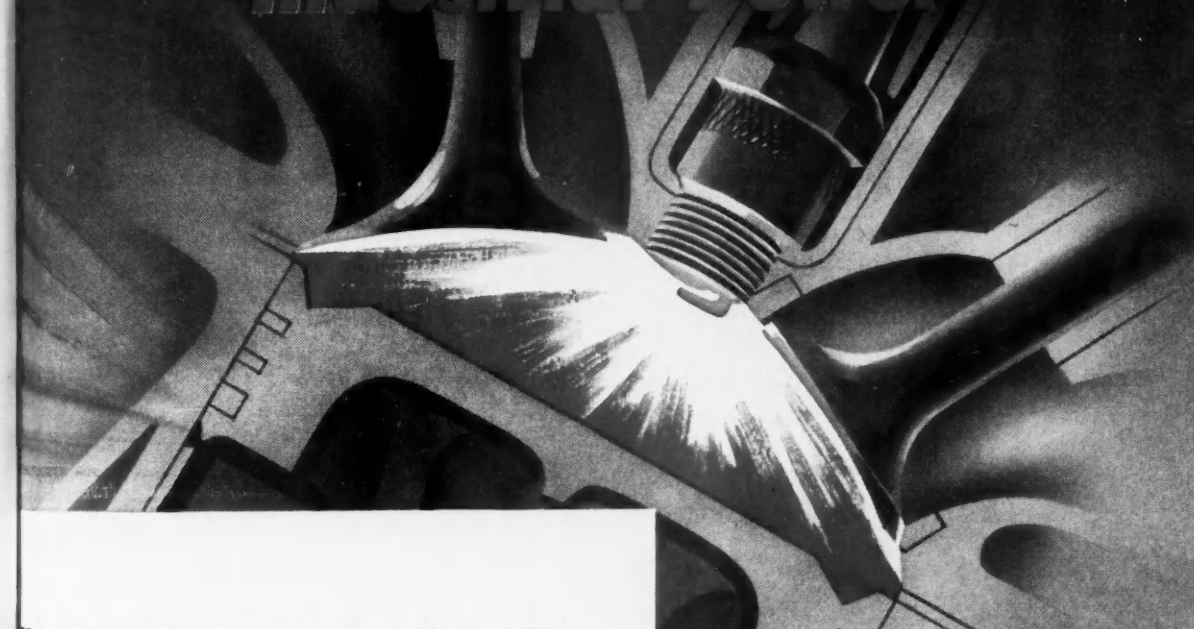


FIGURE 14.

NEW CHRYSLER INDUSTRIAL

Most Sensational Engine Ever Developed For Industrial Power



Yet, it has greater compactness and less weight.

Among its unique design features are a water jacketed throttle body that prevents "icing," integral automatic choke and double breaker ignition distributor.

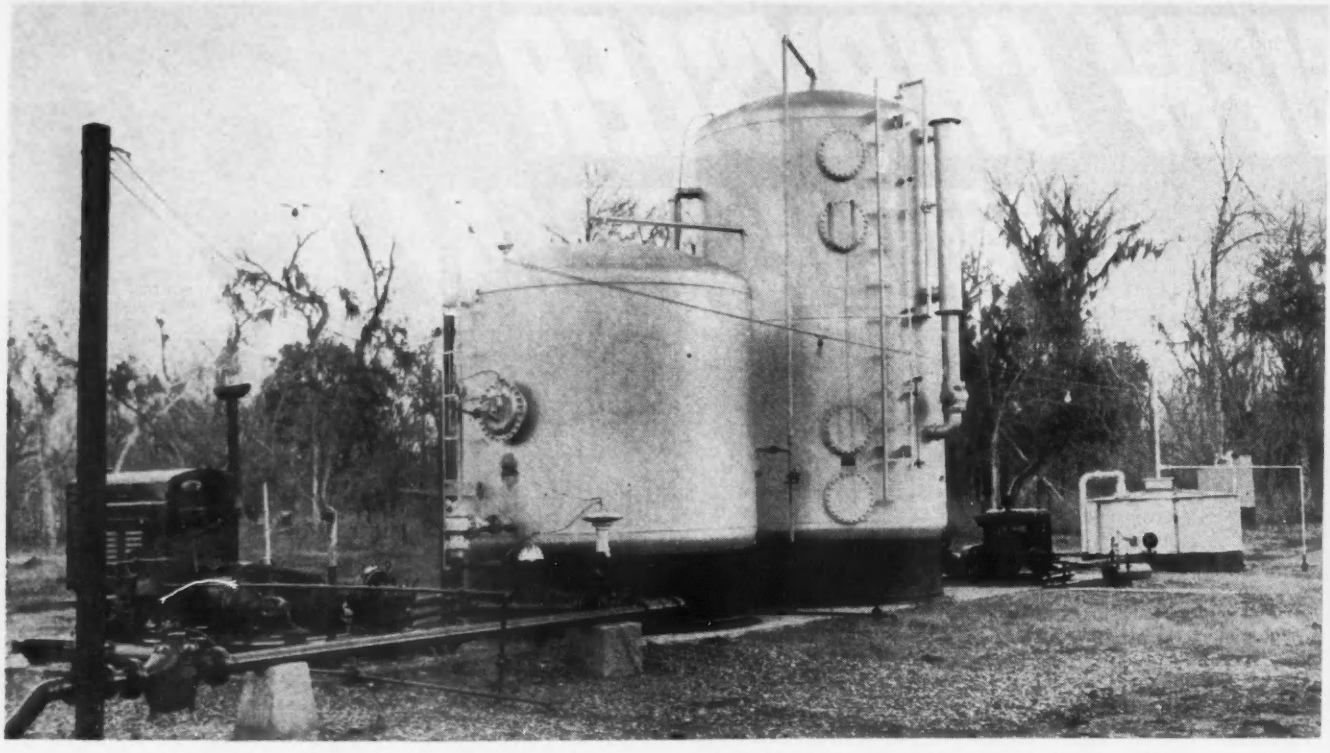
This sensational new Industrial Engine will give you a whole new conception of industrial power and Industrial Engine performance.

Let us show you what it will do for *you*. See your Chrysler Industrial Engine Dealer, or if your job involves special engineering, write us direct. **Marine and Industrial Engine Division, Chrysler Corporation, 12200 E. Jefferson Avenue, Detroit 31, Michigan.**

CHRYSLER

Industrial Engines

HORSEPOWER WITH A PEDIGREE



This closed-type, fully automatic salt water disposal plant handles from 1700 to 2000 barrels of water per day.

Brine Disposed at Small Cost

Pneumatic-Hydraulic Controls Bring Increased Efficiency And Economy to Closed-Type Disposal Plant

By J. E. KASTROP
WORLD OIL Staff

AUTOMATIC controls on a closed-type salt water disposal plant have lightened the routine duties of the lease pumper and farm boss. Periodic inspections are required to insure proper operation and correct adjustment. The hookup described and illustrated here may not be installed according to the best specifications for such equipment, but this arrangement has served its purpose satisfactorily for several years and was built at small cost.

Two independent automatic control systems, one hydraulic and the other by gas pressure, control the flow of salt water gathered from nine tank batteries through water conditioning and accumulator tanks and into a disposal well. This plant handles from 1700 to 2000 barrels of salt water daily. Water flows from a gun barrel tank at each of the nine tank batteries into a bolted, 100-barrel tank which serves as a sump. It is partially buried as shown. An hydrostatic head of about 12 feet of salt water is necessary to flow the water from the tank batteries by gravity into the 100-barrel sump tank.

Water is pumped from the sump tank into a 10- by 15-foot vertical-water conditioning tank. The water conditioner vessel contains two compartments and a double filter, and is designed for 25 pounds pressure. Throttle of the gas engine driving a centrifugal pump is controlled by a small hydraulic pressure-operated transmitter. This unit is connected to a similar transmitter actuated by a float in the 100-barrel sump tank. The two control devices are connected by a one fourth-inch copper tubing filled with oil.

The actuating arm of one unit is

linked to the extension arm of the float in the sump tank as shown in Figure 1. The hookup on the throttle controls and the hydraulic transmitter is shown in Figure 2. Any movement of the lever on the unit connected to the sump float will be transmitted to the unit attached to the engine throttle. By adjusting the length of levers on each unit, the desired amount of corresponding movement between one unit and the other can be obtained. These controls are so adjusted that when the water level in the sump tank rises, the throttle on the pump engine is pushed forward to increase its speed. Thus, as more water gravitates from the tank batteries into the sump, the centrifugal pump is driven at correspondingly higher speeds to pump greater volumes of water into the conditioner tank. Should the water level in the sump fall below the four-inch suction line, the engine will idle until the level rises to a point where the suction is flooded.

The entire salt water disposal system has been designed as a closed one so that oxygen can be excluded. A layer of oil in the gun barrels seals off the water from the atmosphere. The water is never exposed to the air at any time during its flow from the producing well to the injection well. Not only does this method of handling salt water minimize treating, but it reduces corrosion problems.

After the water has been filtered, it flows into a 10 by 10-foot vertical accumulator and backwash tank.

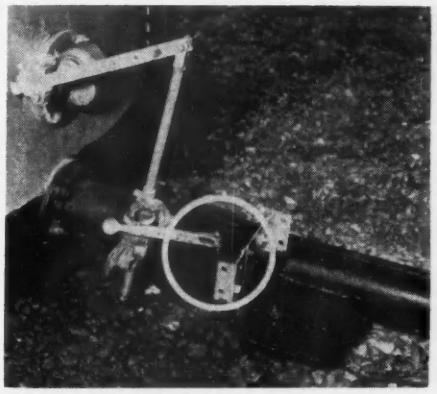


FIGURE 1. Hydraulic transmitter attached to float on 100-barrel sump tank.

Water level in this tank is controlled so that sufficient water is always available to back-wash the filters. Properly treated water is taken from this tank and pumped into an injection well under pressure which varies from 150 to 200 pounds per square inch.

Injection Pump Controls

Extreme flexibility was designed into the controls of the injection system so that the volume handled automatically can vary from zero to maximum. The controlling medium is gas pressure that actuates diaphragm type valves. Gas for the control system is supplied at about 30 pounds per square inch pressure from the gas fuel line.

Water level in the accumulator and backwash tank activates the injection pump system. When the water level is above a predetermined point, the pump discharge line is opened, and the engine driving the injection pump speeds up. Like the first automatic system described wherein water from the sump tank is pumped into the filter tank, the engine driving the injection pump never shuts off completely. When the water level in the accumulator tank drops below a given level, the pump discharge line is automatically closed off, and the engine merely idles. Water circulates through the pump until the water level in the accumulator tank rises again.

Figure 3 shows the arrangement of control equipment which handles the injection water. The control gas is piped to a small scrubber mounted on the dump valve flange of the accumulator tank. From here it is connected to a small piston-type motor valve. Plunger of the motor valve is linked to the extension arm of the float. When the water level is down, the motor valve opens to allow gas pressure in the control system which actuates two spring-loaded diaphragm valves and the diaphragm mechanism of such a valve.

One three-inch regulator valve in the injection pump discharge line is spring-loaded open so that the discharge line is open when there is no gas pressure on top of the diaphragm. The valve closes when the control

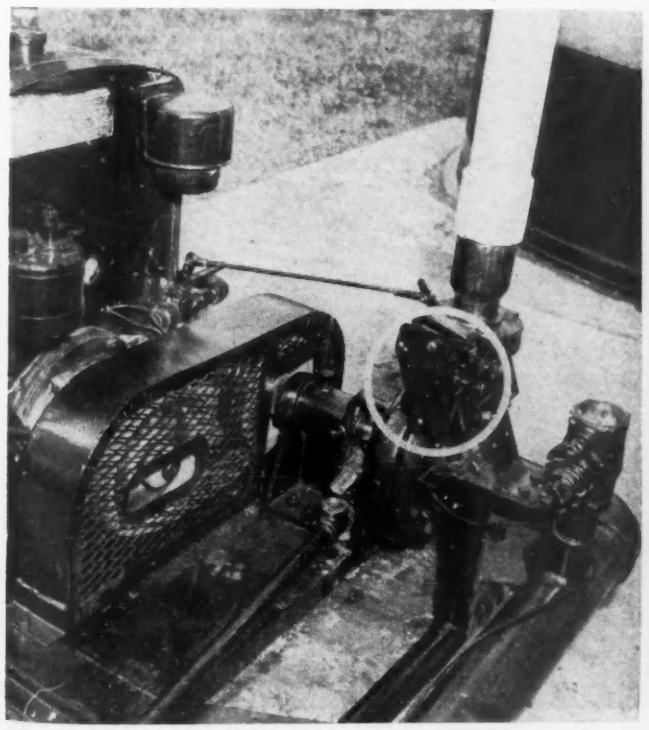


FIGURE 2. Engine drives centrifugal pump that lifts salt water from sump into vertical water conditioner vessel.

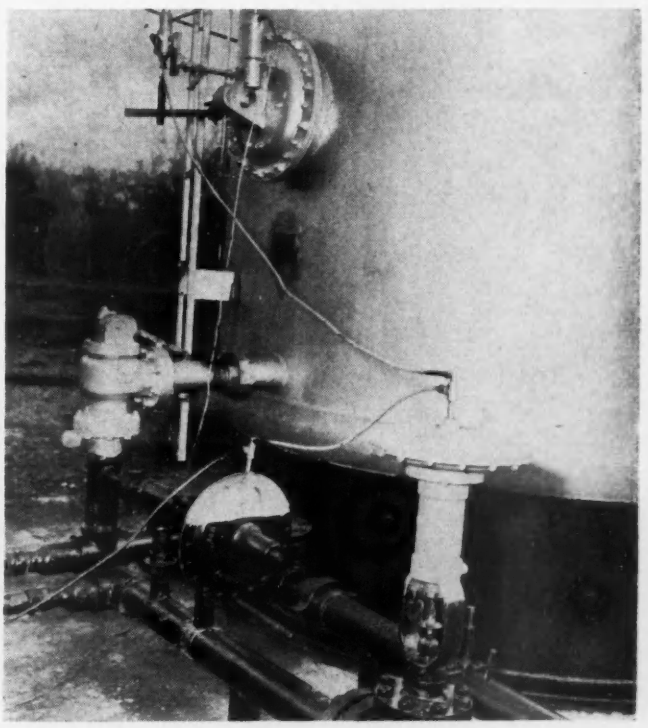


FIGURE 3. Closeup of flow controls on salt water injection system. Motor valve actuated by float is nerve center of entire mechanism.

system is pressurized. A second spring-loaded diaphragm valve is connected across the injection pump suction and discharge. It is spring-loaded closed. It opens when the underside of the diaphragm is pressurized. When this valve opens, it connects the pump suction with the pump discharge so that salt water may be circulated through the pump while the engine idles.

The third device in the control system utilizes only the diaphragm body section of a regulator valve. This diaphragm is also spring-loaded (Figure 4). Purpose of this device is to control the speed of the engine driving the injection pump. The diaphragm body was mounted in a horizontal position. The top bracket of the body section was slotted so that a flat section of steel could be inserted in the slot and attached to the rising stem of the former regulator assembly. This lever was hinged just below the top bracket so that a small movement of the stem would cause a relatively large movement at the end of the throttle lever.

The throttle valve on the engine carburetor was attached to a small grooved pulley. A smaller pulley was mounted on a vertical pipe support welded to the end of the engine-pump skid. A wire line was tied to the throttle lever, threaded around the throttle pulley, around the back pulley, and the end tied to the lever. The engine speeds up when this lever moves to the left, and idles when it moves to the right. When gas pressure is applied to the top of the diaphragm, the engine speeds up. A weak coil spring was attached to the handle to aid the diaphragm in opening the throttle.

Engine Speeded

As conditioned salt water flows into the accumulator tank, the float lifts and actuates the motor valve in the control system. Gas supply from the small scrubber is closed, and the line connected to the three diaphragms is opened to exhaust any gas pressure in that line. When this pressure is released, the valve on the injection pump discharge opens, the bypass between the suction and discharge lines close, and the throttle opens to speed up the engine driving the injection pump.

Salt water continues to be pumped into the injection well so long as the water level in the accumulator is above a given point. When this level drops, the extension arm on the float actuates the motor valve so that the control system is pressurized. When gas pressure is applied to the pump discharge valve, it closes, the bypass valve opens, and the engine throttle is cut back. Under these conditions, the pump merely circulates salt water from the discharge back to the suction until the water level in the accumulator tank builds up. Note in Figure 3 that the dump valve on the accumulator tank has been weighted open so that it plays no part in this control mechanism. A three-inch bypass line equipped with a check valve was connected to the discharge line from the accumulator tank. This bypass line is tied into the injection well. Should the formation take water by gravity alone, due to reconditioning the injection well, this line will carry the water.

In case any part of this automatic control system should fail and need repairing or replacement, the bypass line will carry the water flowing into the plant to an accumulator pond located near the injection well. This open pond has a capacity of several thousand barrels of water should the pump system fail, so that producing wells need not be shut in for lack of water disposal. During several years of operation, there has been no need to flow salt water into the pond. Although this automatic system is not entirely free from attention, it has saved hours for pumpers and farm bosses.

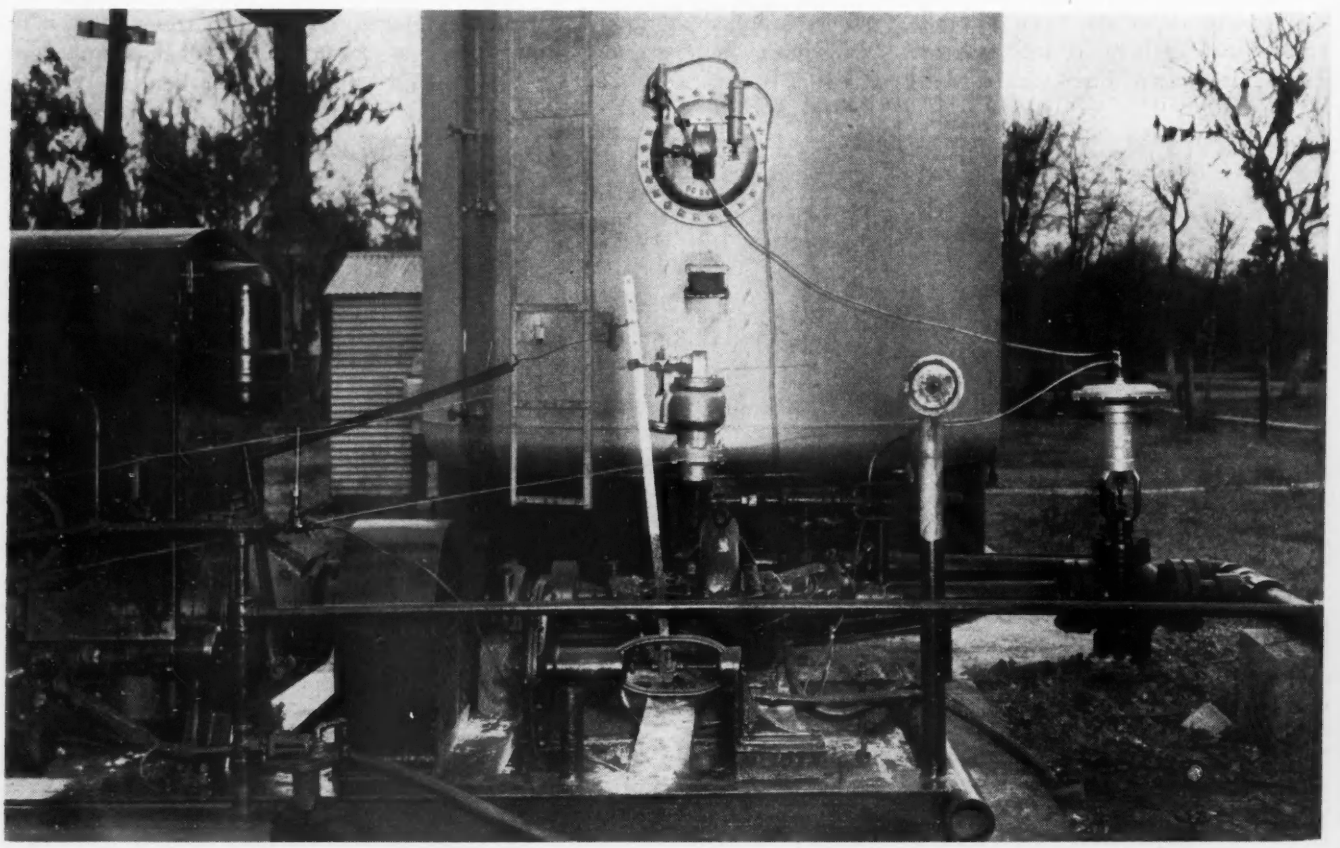


FIGURE 4. Throttle control device on injection pump engine. When gas pressure is applied to the top of the diaphragm, the throttle lever moves to the left and the engine speed is increased.

No. 5 in a series of advertisements on the BIW Non-Lubricated Gate Valve.

CORROSION AND EROSION RESISTANT

Hard-Faced Seats and Gates of Chrome Alloy Proved by more than 32,000 Valves in Christmas Tree Service

BIW

NON-LUBRICATED GATE VALVE

Oil — Water — Gas to 5000 pounds W P

BEAUMONT IRON WORKS CO.

BEAUMONT, TEXAS

A Subsidiary of American Locomotive Company
Atlas Engineering Works, exclusive sales agents

Flooding Ups Limestone Production

Preliminary Results of Water Injection in Near-Depleted Pool Indicate Recovery of 1.5 Million Barrels of Oil

by

M. H. DUBROW
Chief Petroleum Engineer
Continental Oil Company, Houston

H. L. TEMPLE
Petroleum Engineer
Continental Oil Company, Lyons, Kansas

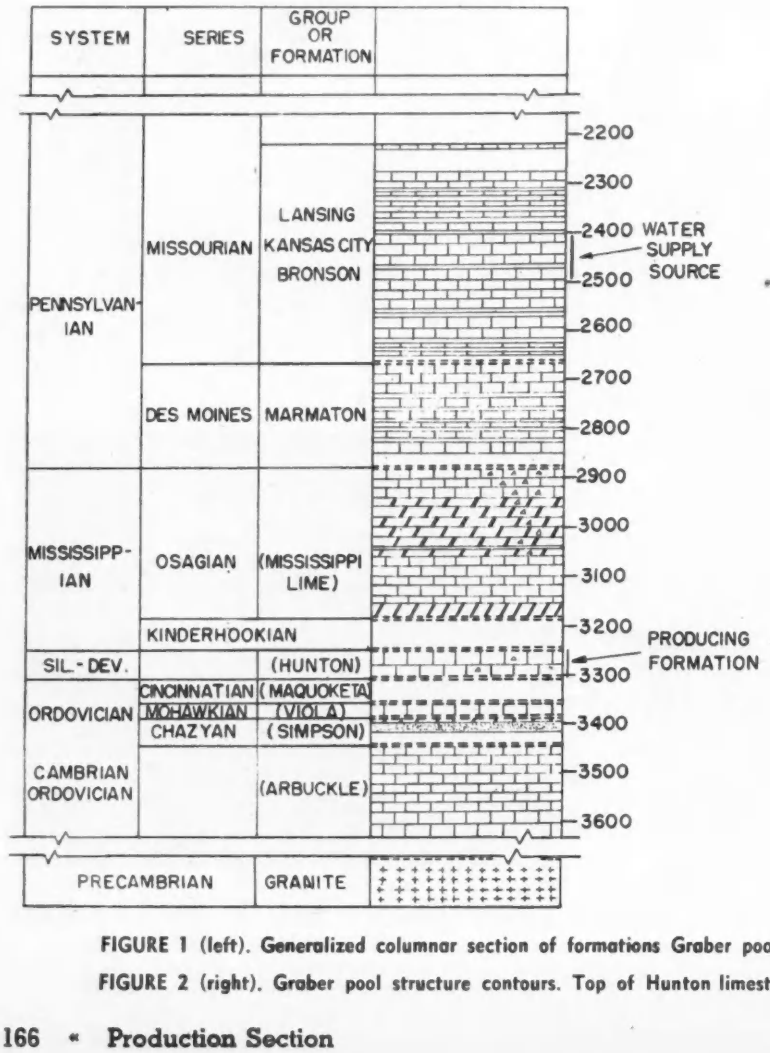
and

W. E. LANDRUM
Consulting Engineer

AN ESTIMATED 1½ million barrels of oil may be recovered from the Hunton limestone in the Graber Pool, McPherson County, Kansas, as the result of a pilot flood started more than five years ago.

Previous success in water flooding the Hunton limestone, the inexpensive pilot flood, relatively shallow depths and the presence of nonuniform permeability make the Graber Pool flood of interest to those concerned with recoveries from limestone and dolomite reservoirs.

Virtually no published data are available on the results of water flooding essentially depleted limestone or dolomite reservoirs. When the one-well pilot flood was started in the Graber Pool, little was known about limestone performance under water injection. First results encouraged further flooding which now includes 22 injection wells covering approximately 1100 productive acres. Current daily production from the flooded area is 1420 barrels of oil and 1890



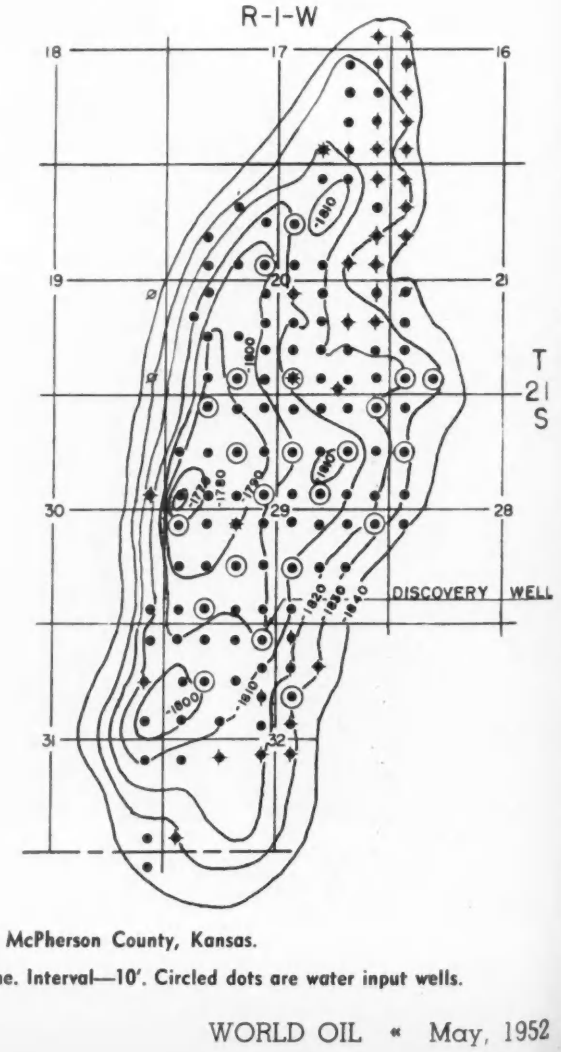
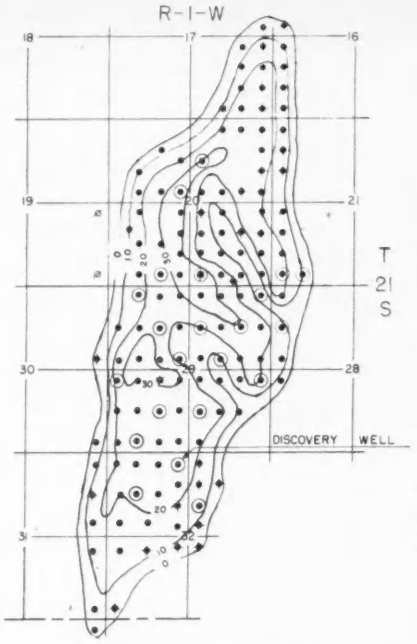


FIGURE 1 (left). Generalized columnar section of formations Graber pool, McPherson County, Kansas.

FIGURE 2 (right). Graber pool structure contours. Top of Hunton limestone. Interval—10'. Circled dots are water input wells.



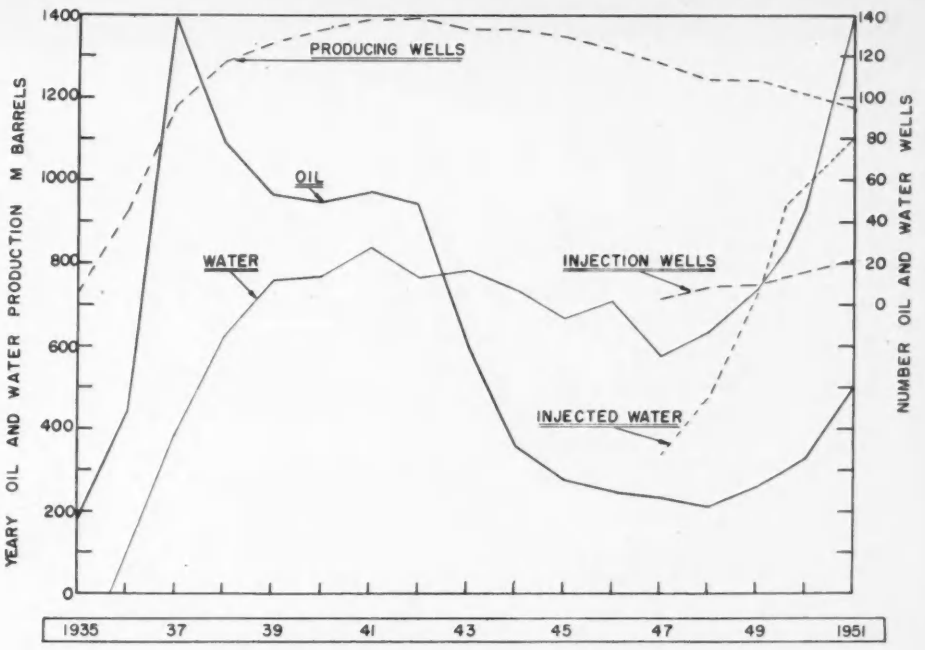


FIGURE 3 (left). Graber pool, Kansas. Isopach map of productive Hunton limestone. Interval 10'. Circled dots are water input wells.
FIGURE 4 (right). Graber pool reservoir performance curves.

barrels of water. All production—except 100 barrels daily of oil—is attributed to water injection.

A pilot flood was begun in January, 1947. Fresh water was injected first into one flank well in the Hunton limestone reservoir. Injection rates averaged 450 barrels per day resulting in oil increases from two offset wells in four months. In the fall of 1948, two more injection wells were added to the pilot area. Salt water from an upper formation was injected into these wells. As of Jan. 1, 1952, after five years of water injection, wells in the pilot flood area had produced 304,666 barrels of additional oil. The pilot area is still producing 375 barrels of oil and 160 barrels of water daily.

Location and Geology

The Graber Pool is located 3½ miles east of Moundridge and 13 miles northwest of Newton, Kan. Oil production is from the Hunton limestone of Siluro-Devonian age encountered at approximately 3200 feet.

Electric logs of the producing formation are not available. Drill cuttings indicate that the Hunton limestone is somewhat dolomitic and intermixed with small amounts of chert. Porosity is of the intercrystalline type with no evidence of fracturing. Permeability is not uniform judging from the variation in first porentials and well performance. The structure (Figure 2) is anticlinal, trending north and south. It is about 3½ miles long, 1¼ miles wide and covers 1990 acres. Overall thickness of the Hunton limestone averages 50 feet, while the gross producing thickness (top to base of porosity) is estimated to average 16 feet. Figure 3 is an isopachous map of the productive Hunton limestone.

Development History

The Graber Pool, largest Hunton limestone field in Kansas, was discovered in June, 1934, by the C. C. Graber 1, owned jointly by Continental Oil Company, Gulf Oil Corporation and The Ohio Oil Company. The discovery well, located in the northeast corner of the northwest quarter of Section 32, Township 21 south, Range 1 west, encountered the Hunton limestone pay formation at 3281 feet and reached a total depth of 3298 feet. Initial daily pumping potential was 870 barrels of oil and no water. As shown in Figure 4, extensive development did not commence until 1936, and it continued through 1938 at which time there were 117 producing wells. Development was completed in 1942 when a total of 138 producers and two dry holes had been drilled. Today there are 109 active wells in the field.

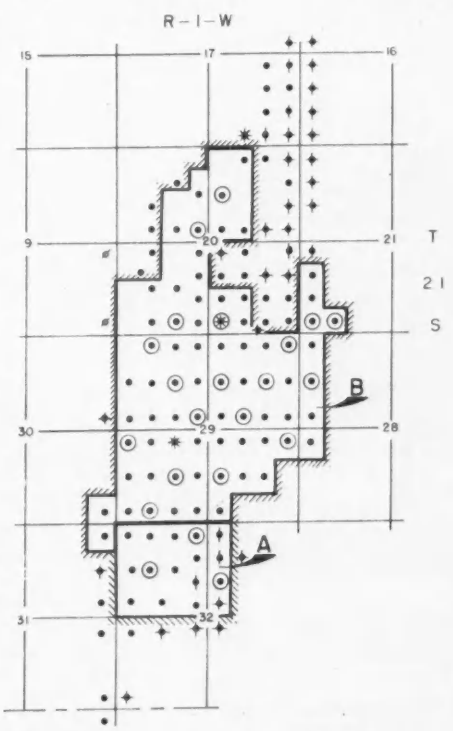


FIGURE 5. Graber pool. A—pilot flood area. B—extended flood area. Circled dots water input wells.

Completion practices were relatively simple. Oil strings were set about one or two feet into the Hunton limestone and the pay section drilled with cable tools. General practice was to acidize with about 3000 gallons of acid. First daily pumping potentials of the majority of wells ranged between a few hundred and 1000 barrels of oil. A few wells exhibited potentials betwen 1000 and 2000 barrels per day.

The general spacing pattern was irregular, but most wells were drilled on a 10-acre spacing pattern. Average spacing density in the pool is about 14 acres per well.

Early Reservoir Performance

The Graber Pool was discovered and developed before many of our present engineering tools were in common use. Lack of reservoir fluid data, reservoir pressure data, and other essential information does not permit the presentation of as definite a performance history as desired.

Early wells in the field flowed when agitated, but all were completed as pumping wells. It is estimated that

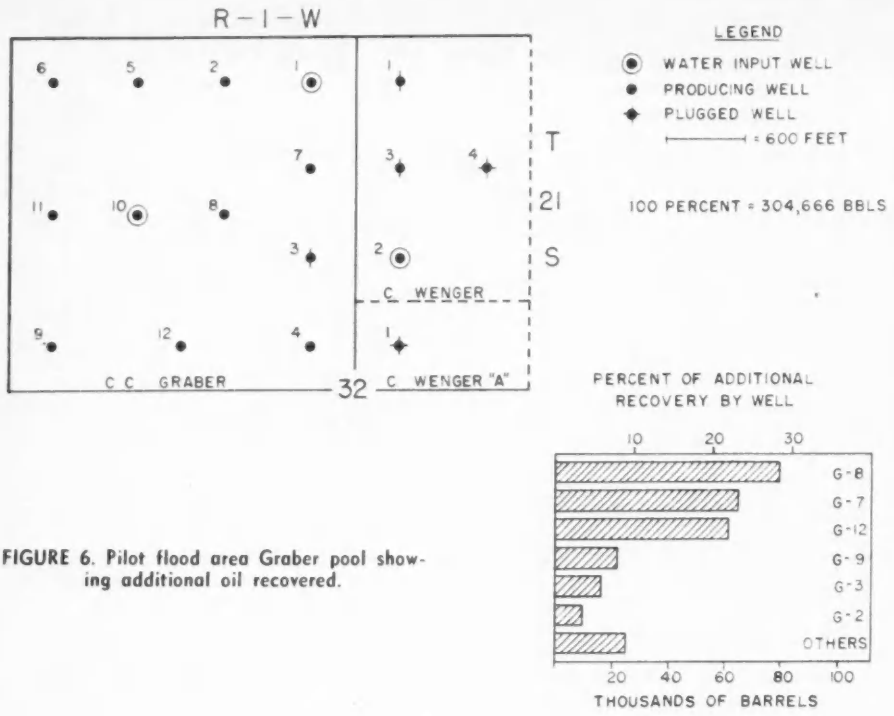


FIGURE 6. Pilot flood area Graber pool showing additional oil recovered.

the oil contained approximately 150 cubic feet of solution gas per barrel of oil. Gravity of the oil was 42 API.

Oil production increased with development as shown on the reservoir performance curves in Figure 4. At the peak year in 1937, the field produced 1,390,000 barrels of oil or an average of 3810 barrels daily. Although development continued at a slow rate, production dropped during 1938 and 1939 due to proration and decreased demand. From 1939 through 1941, oil production remained fairly constant at about 950,000 barrels annually or approximately 2600 barrels per day. Effect of natural decline became evident in 1942, and production began to decline rapidly, typical of a solution gas drive field.

675 Daily Average

Prior to starting the pilot flood in 1946, annual oil production was 246,000 barrels or a daily average of 675 barrels. Daily average oil production per well was only 5.6 barrels. At that time many of the wells were at their economic limit. This situation stimulated action on the part of Continental Oil Company to either attempt water flooding or abandon most of the wells.

Water production started in 1936 and increased rapidly to about 750,000 barrels per year by 1939, a daily average of 2000 barrels. Water production remained near this level for several years but began to decline somewhat after the oil production decline started. At the time water injection commenced in January, 1947, daily average water production was 1900 barrels. About 1300 barrels of this volume was being produced from two leases in the northeast portion of the pool where influx of water has been more pronounced.

Cumulative oil production as of Jan. 1, 1952, for the total pool was 9,930,338 barrels, of which 624,964 barrels is secondary oil. Cumulative water production was 11,379,200 barrels. Total water injected into Continental-operated leases as of Jan. 1, 1952, was 3,260,216 barrels.

Recovery Data

Total developed area contained 1990 acres. Pertinent oil recovery data under primary operations are tabluated in Table 1.

Individual well primary recoveries based on lease oil production range from 18,000 barrels to 93,000 barrels per well. The pool average is 67,430 barrels per well.

The pilot flood area is located in the south end of the pool (Figure 5). The extended flood area is shown in Figure 5.

Figure 6 indicates the outline of the pilot area, injection wells, producing oil wells and additional oil recovered.

The pilot injection program started with the Conrad Wenger 2 for water injection. Water used for injection was obtained from a fresh water well located nearby. The injection well selected was located relatively low on structure to be able to inject large volumes of water with minimum danger of bypassing. Water injection started in January, 1947, at an average daily rate of 600 barrels. Based on the additional oil recovered due to water injection, two injection wells were added to the pilot area in the fall of 1948.

One Responded Poorly

The performances of only three wells affected by the flood are discussed in detail. Two of the wells responded very favorably to water injection; the response of one well could be classed as poor.

C. C. Graber 3. Figure 7 shows that within two months after injection started, average daily oil production from the direct west offset, increased from 4 to 17 barrels. Production continued to increase rapidly for three months, and the well reached its peak daily oil production rate of 65 barrels in June, 1947. The following month, July, 1947, daily oil production began to decline and the well commenced to produce water. Within five months oil production had decreased to an average of 30 barrels daily, and water production had increased to 70 barrels daily. Oil production continued to decline during 1948, with water production increasing to an average of about 135 barrels per day. The well was shut down in September of 1950 due to the high water-oil ratio.

16,650 Barrels

It is estimated that 16,650 barrels of additional oil over and above the natural decline of the well has been recovered as a result of water injection. This recovery is far less than the volume obtained from the other two wells discussed.

C. C. Graber 7. A diagonal northwest offset to the injection well, showed a slight increase in oil pro-

TABLE 1

Primary Oil Recovery to 1-1-52 (Barrels)	Developed Acres	Gross Acre-Feet (Estimated)	No. of Wells	ESTIMATED RECOVERY		
				Barrel per Acre	Barrel per Acre-Foot	Barrel per Well
9,305,374	1990	32,600	138	4676	285	67,430

NEW

MISSION E-Z SWAB

makes your swabbing easier, safer, better at far lower costs

Mission engineers set out years ago to perfect a tool that would make any swabbing job safer and easier. Here's the result . . . the new *Mission E-Z Swab* which brings advantages and economy to the field that never have been incorporated in any other swab. Under the most adverse and varied conditions we could find, *Mission E-Z Swabs* have proved superior in run after run. If *Mission E-Z Swabs* do not prove more satisfactory in comparative tests than the make you are now using, the entire purchase price will be promptly refunded. Ask your Mission Representative for complete details or write for Bulletin No. E-Z 751. Specify *Mission E-Z Swabs* at your supply store.

MISSION MANUFACTURING CO.

HOUSTON, TEXAS

Export office: 30 Rockefeller Plaza, New York

duction eight months after injection started. Well 7 required eight months from the first increase to reach its first oil production peak of 42 barrels daily, which was 35 barrels more daily oil production than before injection. (It is possible that the drop in oil production for June and July, 1948, is related to decreased injection volume in May and June, 1948.) For the balance of 1948, oil production continued to increase slowly to a new peak of 50 barrels per day average for November. During the next two months, to February, 1949, the daily average oil production declined about 10 barrels, then increased again slowly, so that by August, 1949, peak daily average production was 70 barrels. It is believed that the 1949 increase in oil production is attributable to the addition of C. C. Graber 1 as an injection well in October, 1948. This well obtained injection water from a section of the Kansas City limestone at a depth of 2450 feet.

Of the first three wells to respond to water injection, the better performance of C. C. Graber 7 was due not only to its better structural position, but also to its greater distance from the injection well. C. C. Graber 7 has produced 66,576 barrels of additional oil to Jan. 1, 1952, and is still producing an average of 20 barrels of oil and 90 barrels of water daily.

Recovery High

Oil recovery of 66,576 barrels above its estimated production by primary methods makes Graber 7 one of the outstanding wells of the pilot flood to date.

C. C. Graber 8. This well, located 1400 feet from Conrad Wenger 2, gave first indication of increased oil production in February, 1949. Oil production increased a few barrels per day during February, March and April; and then sharply increased to 32 barrels daily in May, 1949. Before C. C. Graber 8 was affected by the flood, it was averaging about two barrels of oily daily. Production of oil continued to increase at a rapid rate, reaching 84 barrels daily during December, 1949. Oil production increased during 1950, and for August the well averaged 109 barrels per day. This well has reached a higher peak daily oil production rate than any of the other wells, and, most significantly, no water production has been observed. Cumulative additional oil has been 85,408 barrels to Jan. 1, 1952.

As was the case with C. C. Graber 7, C. C. Graber 8 also was affected by two water injection wells, inasmuch as the Graber 10 injection well is located 660 feet to the west. This injection well also used salt water from the Kansas City limestone. Since C. C. Graber 8 did not begin to increase in oil production until after the conversion of Graber 10 to water injection in October, 1948, it seems reasonable to conclude that the effect of water movement from two directions was chiefly responsible for the high daily oil producing rate. Up to the time that C. C. Graber 8 indicated a large increase in oil production and C. C. Graber 7 showed a second peak daily oil rate, the pilot flood had been a line flood. The wells had responded to a modified form of pattern flooding.

Pilot Flood Results

Figure 8 shows the daily average oil and water production and water injected. Nine wells have been affected over a five-year period. In addition, minor oil production increases have been obtained in three other wells resulting in a total of 304,666 barrels of additional oil recovered to Jan. 1, 1952. It is interesting to note that in spite of the fact that the pilot area was not under full scale flooding operations from the start, the peak daily oil production under flooding was about equal to the peak under primary operations. Current daily production is 375 barrels of oil and 160 barrels of water.

The total volume of water injected into the pilot area wells was 1,176,645 barrels. This is a ratio of 3.9 barrels of water injected per barrel of additional oil recovered. This ratio approximates that experienced in most sandstone floods. The estimated volume of additional water produced since flooding was 325,685 barrels, leaving an estimated net injected water volume of 850,960 barrels.

Old Wells Used

The pilot water flood in the Graber Pool has been economically successful. This success has been due in part to the fact that old wells were used for water injection, no expensive treating and injection facilities were required, and the cost of converting the old

■ CONTINUED ON PAGE 184

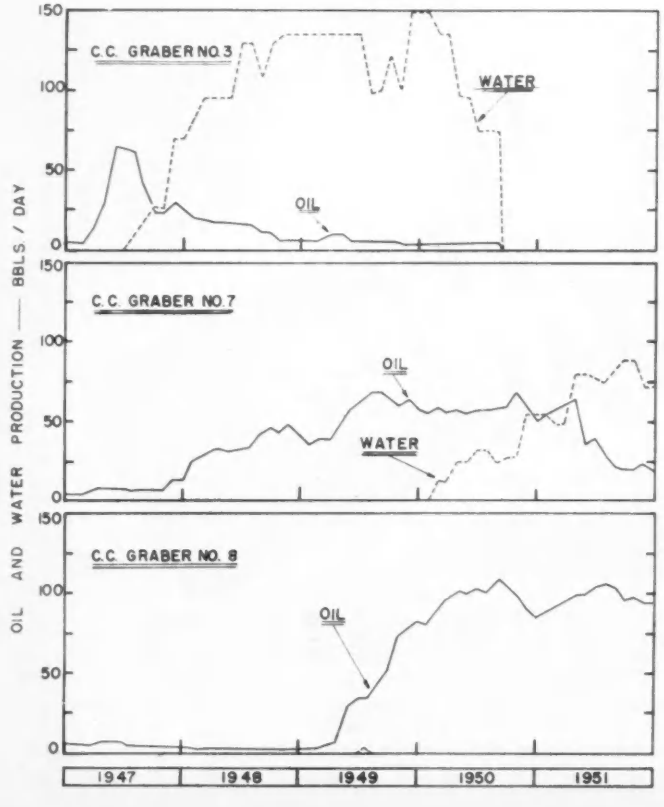


FIGURE 7. Well performance curves, pilot flood area, Graber pool.

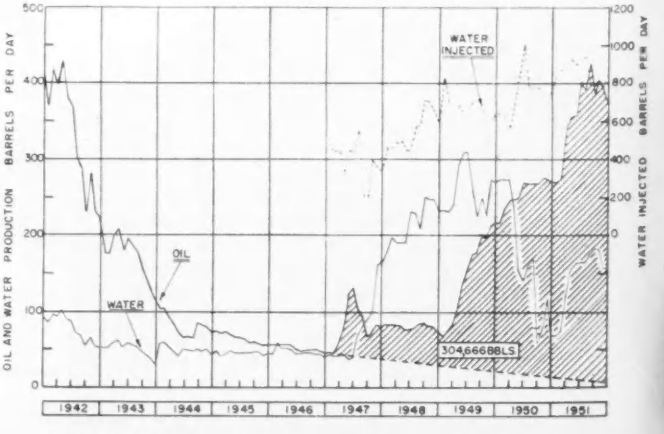


FIGURE 8. Pilot flood area, performance curves, Graber pool.

There's EVERY Size in the BETHLEHEM FAMILY of PUMPING UNITS

It seems that scarcely a year goes by without new oil-field pumping problems, and new demands for additional Bethlehem pumping units. A year ago we were telling you about a little guy called the 16D-5. Now there's one even smaller—the Bethlehem 10D-4, a tiny mite with 10,000-in.-lb torque capacity and load rating of 4700 lb at the polished rod. This beam-balance unit is perfect for water-well service or shallow stripper-well assignments. No longer need you buy oversized equipment for your small pumping jobs.

Of course this smallest machine is but one of many units in the Bethlehem line. It has plenty of bigger brothers in the medium-sized bracket. And if you keep on climbing, you'll finally come to the whoppers—as, for example, the mighty 320.

But even that one isn't the biggest. Now in production and soon to be seen in the field is the family colossus, Bethlehem's 640. This king-size giant is designed to lift oil from wells ranging to two miles in depth. Its long, slow 12-ft stroke has an API rating of 640,000 in.-lb (708,000 in.-lb at nine spm). This slow stroking eliminates gear overloads and excessive rod stress.

Thus Bethlehem offers a unit for every condition of modern pumping—from shallow water wells to deep-down oil strikes. Remember that the next time you add new outfits to your equipment. In the meanwhile, a Bethlehem engineer will gladly furnish complete details whenever you say.

BETHLEHEM SUPPLY COMPANY

General Offices:
21 E. Second St., Tulsa, Okla.
West Coast Headquarters: Los Angeles, Calif.

Export Distributor:
Bethlehem Steel Export Corporation
Canadian Representative: Rocky Mountain Supply Co., Ltd., Calgary, Alberta

BETHLEHEM STEEL

In addition to its manufacturing plants and its sales and engineering service, Bethlehem Supply Company maintains stores throughout the Rocky Mountain, Midcontinent, Southwestern, and California oil fields. There are almost 50 of these modern, up-to-the-minute stores, all fully stocked to meet local requirements.

Flowmeter for Water Injectivity Profiling

Tested and Easily Run in Water Input Wells, New Instrument Accurately Measures in Holes with 2-1 Diameter Variation

By DR. R. G. PIETY and B. F. WILEY

Phillips Petroleum Company, Bartlesville, Okla.

A NEW system of measuring water flow permits accurate determinations of injestion rates throughout the injection interval of a flooded section. It has proved useful in detecting leaks within the casing and at the casing seat. Data obtained are of more than usual significance to the reservoir engineer in following the performance of water flod projects. The non-conformity between injection rates and measured permeabilities introduces evidence for more study on reservoir performance.

To evaluate the future or past performance of a secondary recovery water flood it is necessary to have a record of the water input. Generally, water-flood operations make some use of old primary production wells which have often been drilled so long ago that the records have been lost or they contain doubtful statements of fact which cannot be verified. Any attempt to estimate the sections taking water is frequently a mere guess. The need for reliable information on the distribution of input water led to the development of a flowmeter to determine the injectivity profile of water input wells.

It might seem at first that a simple flow velocity measurement would do the job. There are three difficulties which make the problem more complicated than a simply velocity measurement.

• The hole frequently has a variable diameter. A change of diameter from five to seven inches, for instance, changes the area in the ratio of 25 to 49; accordingly, a change of radius of one inch could produce a very deceptive injectivity profile, if the apparent flow velocity is not corrected. A correction can be made by taking a caliper log, provided a reasonable estimate of the contour of the stream lines can be made in the final evaluation. The stream lines must be known because part of the enlargement may contain almost stationary water.

• Because the flow is usually stream line, or laminar, the flow is not uniform across a diameter of the hole. It is easy to show theoretically, as texts on fluid flow demonstrate, that fluid at the center of a smooth cylindrical pipe moves at twice the average velocity. In a well the side walls are rough, so that the conditions assumed in simple theory are not exactly obtained in practice. The introduction of a flow measuring device will, in general, change the ratio of maximum to average velocity, according to the hole diameter. In any case, significant errors are possible. If turbulence is present either naturally or because of the introduction of the instrument, than the velocity in general, will be much more constant across a diameter of the hole.

• Owing to many slight deviations of the hole from vertical, the position of an instrument in a hole is in doubt unless centering means are provided. Lack of centering may introduce a change in the apparent flow rate as mentioned above. In practice, it is important that the injectivity profiling device also locate casing leaks and loss of fluid at the casing seat, where the hole diameter often changes. Fissures and cracks may present special problems depending on the method of measurement.

Description of Instrument

In order to obviate these complicating factors, a somewhat unconventional flowmeter design was devised. It may be most easily understood by starting with a simplified representation as shown in Fig. 1. A vertical section of a pipe line or well casing containing a hot-wire sensing element for detecting fluid flow is shown. A flow path or bypass through a pump and around the section of pipe containing the hot-wire is also shown. The rate of flow in the bypass is controlled by the pump, which is calibrated in terms of rotational speed versus output. Suppose the pipe line or casing is carrying water at the rate of 30 gallons per minute or about 1000 barrels per day. If the pump is started and adjusted to a pumping rate of exactly 30 gallons per minute, flow in the section of pipe line containing the hot-wire will be brought to zero. As a result, temperature of the hot wire will reach a maximum. Any overspeeding of the pump will cause circulation around the closed path of all water in excess of the 30 gallons per minute rate; as it flows past the hot wire it will cause a temperature decrease. Therefore, there can be only one flow condition for which the temperature of the hot wire will be a maximum. This condition is obtained only when the metering pump is carrying a flow exactly equal to that of the pipe line. The temperature of the hot-wire varies its resistance which is indicated to the operator.

It would be simple to set up and operate in a pipe line the flowmeter system just pictured. The next step is to arrange the parts in a new geometric order and make the assembly free to move up or down a bore hole. This arrangement is shown in Figure 2.

All flow paths are now concentric. The bypass or passage through the pump is on the axis. The passage containing the hot-wire, or null indicator as it is called, is the annular space between the pump and the outer case A third parallel passage has been aded. This is the annular clearance space between the meter and the wall of the bore. This third path is the result of the compromise made in giving the instrument freedom of

movement. However, its effect can be minimized. A flexible brush is placed like a collar around the meter between the intake and outlet ports. By this means the resistance of the annulus outside the meter is greatly increased and any flow of water around the meter will be accompanied by a much increased flow of water through the annulus containing the hot-wire. It is now possible to determine the state of motion of the water in the two annular passages, and so in turn it is possible to adjust the speed of the metering pump until it carries the exact amount of water flowing past its location in the bore. Flow rate observations may then be made at any level in the bore by adjusting pump speed and recording the speed with corresponds to the maximum reading on the temperature indicator.

This method of measurement tends

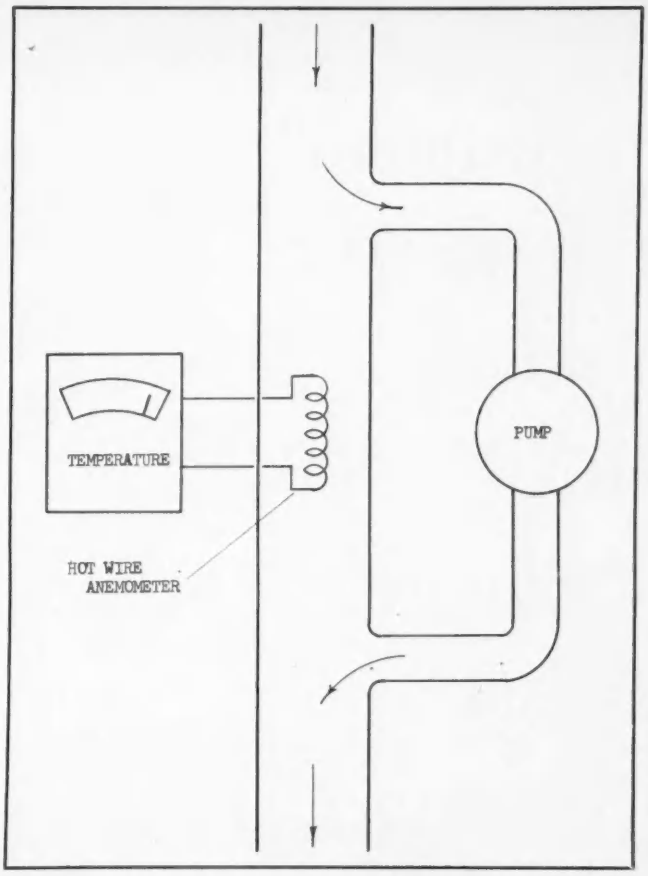


FIGURE 1. Schematic diagram of the fundamental principle involved in this new system of determining water injection rates throughout an injection well.

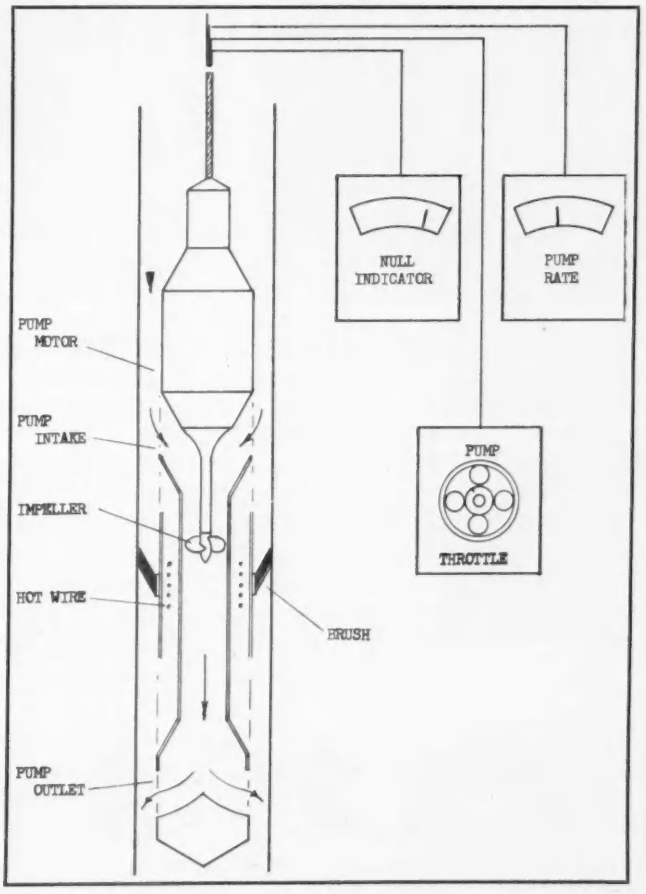


FIGURE 2. Simplified diagram of flowmeter equipment arrangement for use in a well.

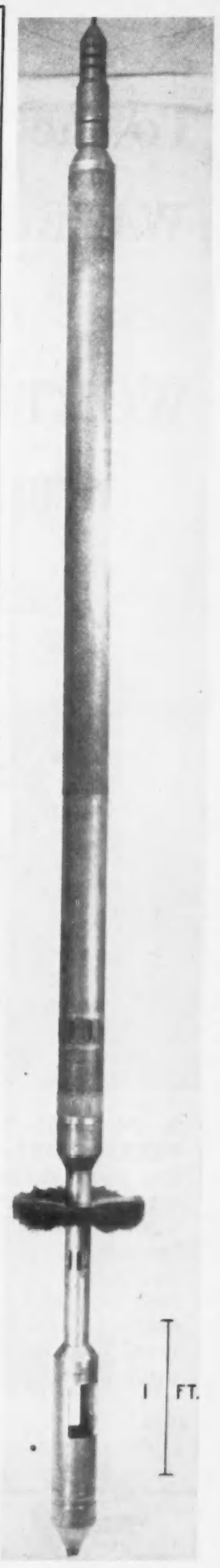


FIGURE 3. Injectivity profiling flowmeter.

About the Authors

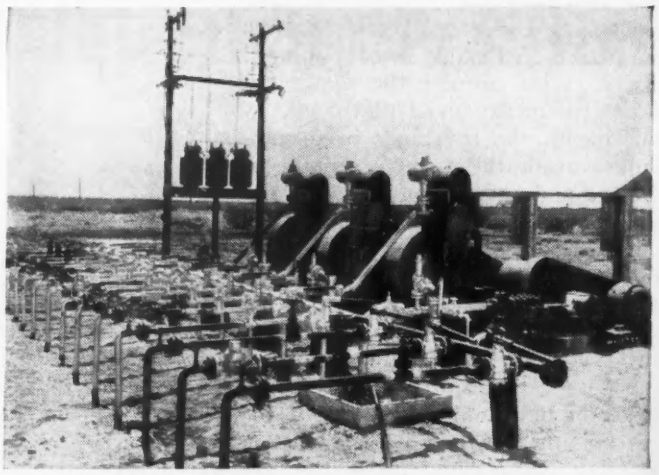
Dr. R. G. Piety

B. F. Wiley

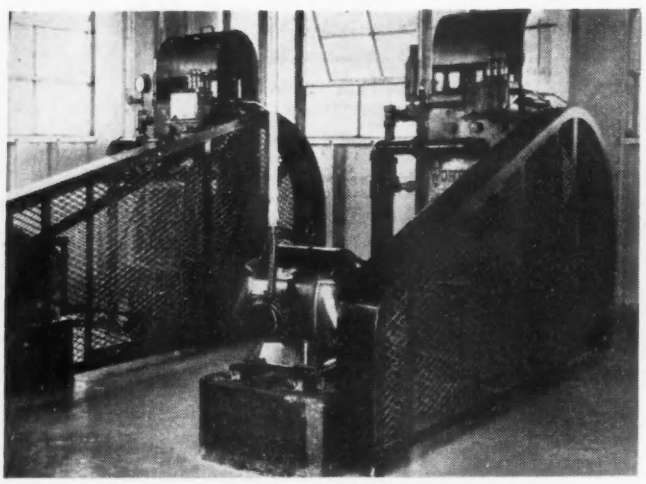
DR. R. G. PIETY studied for a B.S. at the University of Chicago and completed his doctorate at Yale University in 1936. From 1937 to the present, except for leave during World War II, he has been chief of the Geophysics Section of the Research and Development department, Phillips Petroleum Company.

B. F. WILEY was graduated from Texas A&M College in 1936 with a B.S. degree in electrical engineering. Following graduation he was employed by the Seismograph division of Phillips' Land and Geological department. He was actively engaged in geophysical exploration until 1946, when he transferred to the Research and Development department. For the past five years he has specialized in the design and development of bore hole logging equipment.

To the "old timers" WATER FLOODING means WORTHINGTON'S VTE* pumps at work

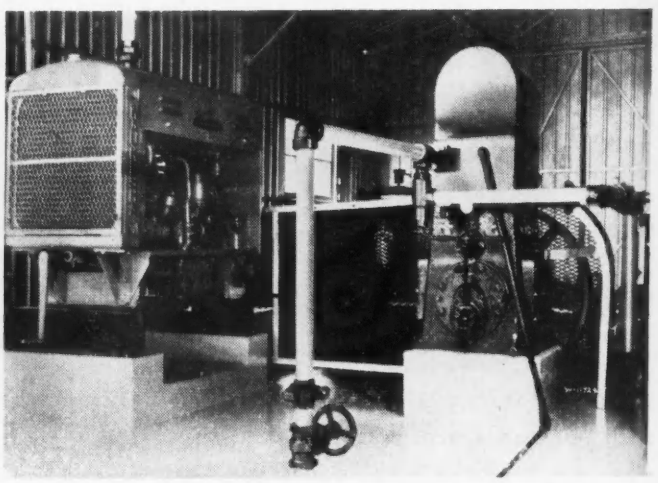


1. OUTDOORS WITH MOTOR DRIVE—Outside work, 24 hours a day without shutdown. That's the kind of service many Worthington VTE-pump-equipped installations are giving. Worthington has been furnishing water-flooding equipment for 25 years—has more than 112 years' experience in pump engineering. The first users of the process began with Worthington, and the choice of many today is the versatile VTE line.



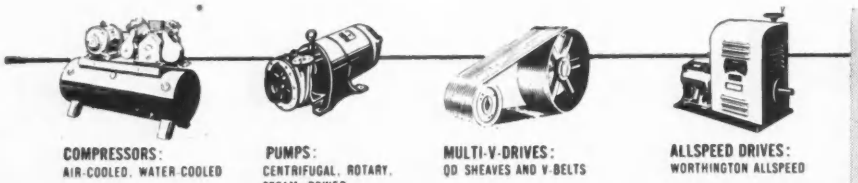
2. INDOORS WITH V-BELT AND ELECTRIC MOTOR DRIVE—Use it anywhere. The VTE has such valuable design features as solid ceramic plungers . . . patented flange-and-screw type stuffing-box gland which cannot become cocked . . . stainless steel heat-treated valves and seats . . . automatic positive force-feed lubrication of enclosed running parts . . . stuffing boxes located at top of cylinder . . . crankshaft at bottom, engine-style.

**Vertical triplex enclosed*



3. INDOORS WITH ENGINE MULTI-V-DRIVE—There's a VTE for *any* job—285 to 5,659 barrels a day, pressure 850 to 2,700 psi. Special fittings for salt water. The VTE is by reputation *a water-flooding pump.* It represents the oldest pump manufacturer's contribution to this vital and modern process. Write for Bulletin W-414-B44A. *Worthington Corporation, formerly Worthington Pump and Machinery Corporation, Pump and Compressor Merchandising Division, Harrison, New Jersey.*

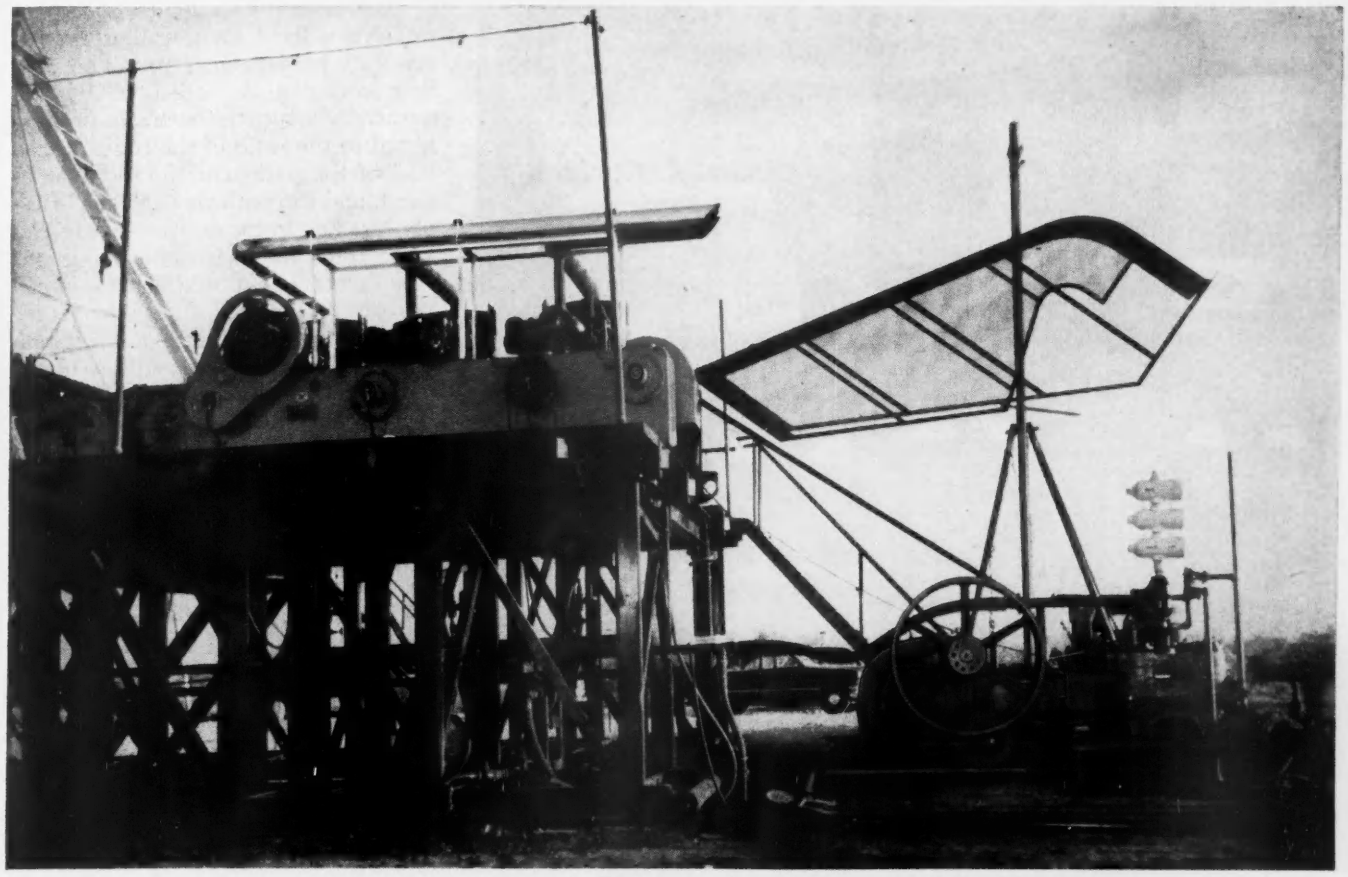
PC.2.7



WORTHINGTON

Standard Pumps

Buy these Worthington standard products from your local distributor



BORN IN THE OIL FIELDS, the Worthington QD sheave is first choice of all industry. Servicing rigs like this one is a much easier job since the QD became available—it's easier to get on, easier to get off, yet always tight on the shaft. And you can get the sizes you need QUICKLY!

We built it to your specifications

Yes, it was the demands of oil production men like you that gave the Worthington QD* sheave its start. Today *all* industries use it. In fact it's the *most widely used* hub-and-rim combination in existence.

Why?

IT'S STRONGER because each size is individually designed for the load it has to carry. Not just *one* standard design for all sizes.

IT'S EASIER TO GET ON—lightweight split hub is clamped to shaft, then heavier taper-bored rim is easily slipped over and press-fitted to hub.

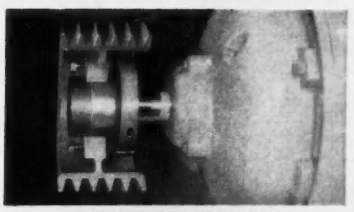
IT'S EASIER TO GET OFF—long pull-up bolts serve as jack screws to remove rim, hub stays put so that there's no realignment problem.

IT'S QUICKLY AVAILABLE—Local distributors in all oil-field areas are stocked-up in most sizes and they're backed up by factory stocks in Los Angeles, Fort Worth, Houston, Tulsa and New Orleans.

IT'LL PAY YOU TO STANDARDIZE on the Worthington QD*. Worthington Corporation, formerly Worthington Pump and Machinery Corporation, Multi-V-Drive Sales Division, Buffalo, N. Y.

*Reg. U. S. Pat. Off.

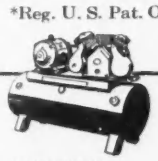
EASIER TO GET ON



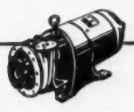
EASIER TO GET OFF

YET ALWAYS TIGHT ON THE SHAFT

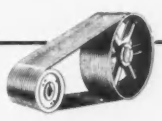
MV.2.8



COMPRESSORS: AIR-COOLED, WATER-COOLED



PUMPS: CENTRIFUGAL, ROTARY, STEAM, POWER



MULTI-V-DRIVES: QD SHEAVES AND V-BELTS

ALLSPEED DRIVES: WORTHINGTON ALLSPEED

WORTHINGTON

Multi-V-Drives

Buy these Worthington standard products from your local distributor

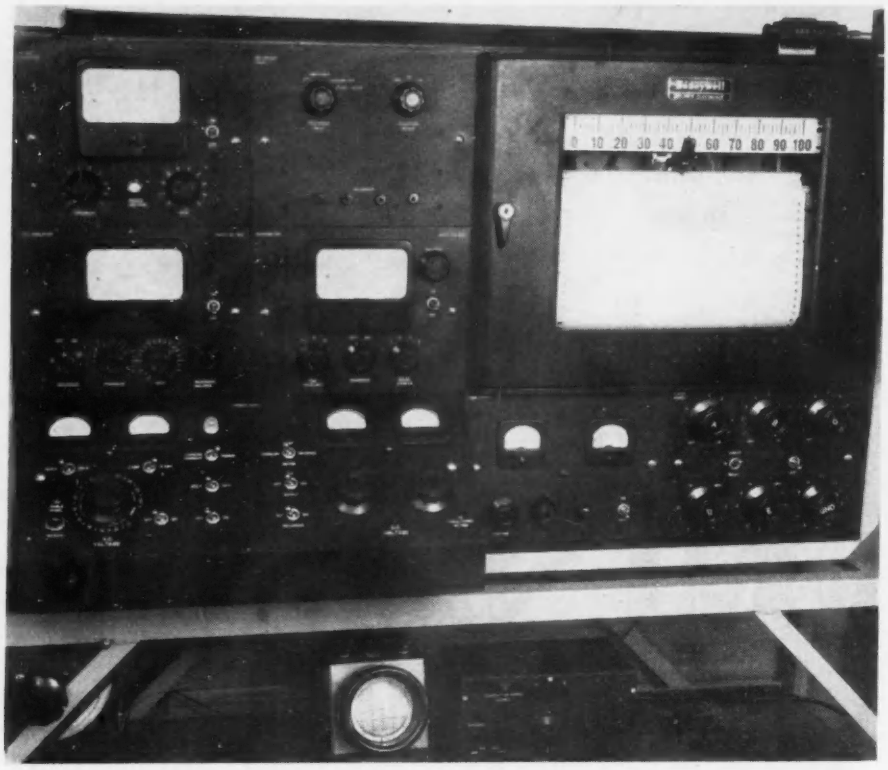


FIGURE 4. Instrument panel and controls for operation of flowmeter and other associated logging equipment.

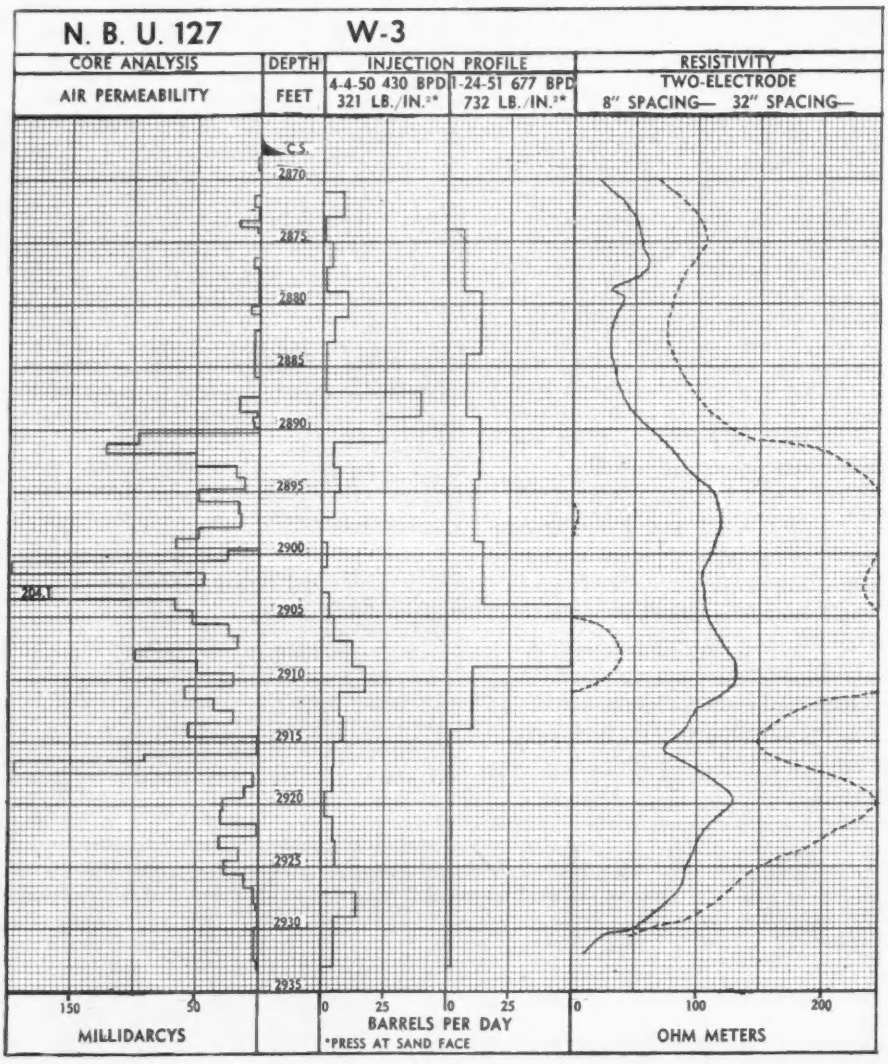


FIGURE 5. Results obtained from practical application of the flowmeter observations. Two typical injectivity profiles of an injection well in the North Burbank field of Osage County, Oklahoma, are shown.

to have a fixed error rather than a constant percentage error. The zero flow condition is indicated with a sensitivity which is inversely proportional to the ratio of the resistance to flow of the path past the sensing element, and the path through the brush packer. For instance, the sensing element under most favorable conditions can detect about one fourth barrel per day, so that if four barrels per day are bypassed through the brush packer, the effective sensitivity of the null detector is approximately one barrel per day. The brush packer will contact the walls of the hole when the diameter changes from 5 inches to 12 inches or from 7 inches to 16 inches according to brush size. If the brush loses contact with the walls of the hole the pump speed control for balance merely becomes less critical as the percent bypassed water increases. The brushes are of stainless steel wire which are greased before running in the hole. The sensitivity is adversely affected by a thin coating of oil on the sensing element. In some wells a layer of oil has been found floating on the input column of water. If the hot-wire flow sensing element were calibrated in terms of flow directly, changes in sensitivity of the order of 400 percent, depending on the flow, might arise due to this cause. If the flow were indicated directly this would be serious, but the change in the accuracy of the null balance is very much less significant.

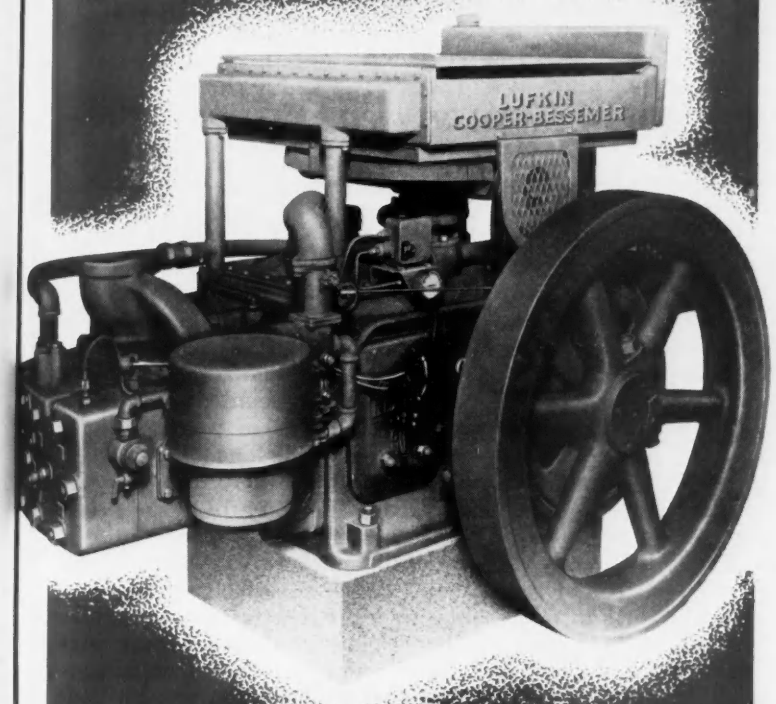
The speed of the pump motor is determined by a counter which counts the pulses per minute sent up the cable by a circuit breaker, which is actuated once per revolution of the motor. The motor speed is controlled by a rheostat at the surface. Because of bearing and motor brush friction the range of the metering pump is limited to a ratio of about 10 to 1. With the present design it is necessary to change the pump propeller to change the operating range.

It was observed in a test with the equipment turned on while running into a well that the water level could be easily observed since the pump is made to rotate or "windmill" immediately after the propeller contacts the water. This action made it easy to measure the water level while going in and out of the hole.

The instrument has been operated

CONTINUED ON PAGE 186

Lufkin



THE ENGINE OF MANY USES WHERE LOW MAINTENANCE, DEPENDABLE LONG LIFE SERVICE IS A NECESSITY

GSDH — 40-60 H. P.

Gas ENGINES

2 CYLINDER 2 CYCLE
400-600 RPM . . .

HORIZONTAL RADIATOR
FOR NON-DIRECTIONAL COOLING

●

2 CYLINDER 2 CYCLE
FOR SMOOTHNESS

●

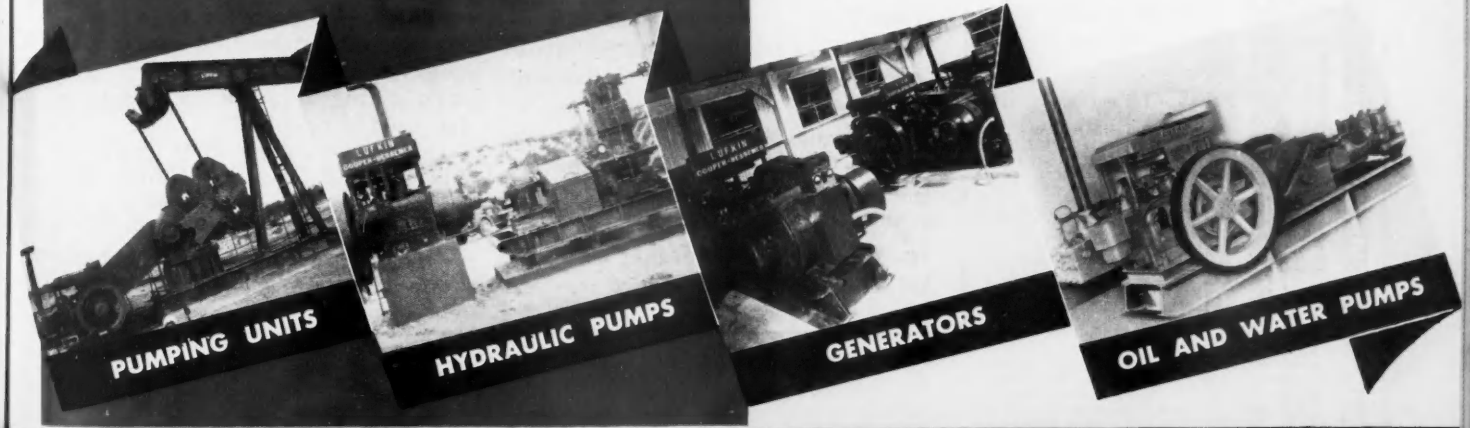
OIL COOLED PISTONS
FOR LONGER RING AND CYLINDER WEAR

●

FULL PRESSURE LUBRICATION
FOR MORE POSITIVE LUBRICATION

●

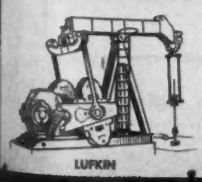
HEAVY DUTY CROSSHEAD CONSTRUCTION . . . . . .
FOR CONTINUOUS SERVICE



LUFKIN FOUNDRY & MACHINE COMPANY

LUFKIN, TEXAS

Branch sales and service Houston, Dallas, New York, Tulsa, Los Angeles, Seminole, Oklahoma City, Corpus Christi, Odessa, Kilgore, Wichita Falls, Casper, Wyoming; Great Bend, Kansas.
Lufkin Equipment in CANADA is handled by
THE LUFKIN MACHINE CO., LTD. 14321 108th Avenue, Edmonton, Alberta, Canada.


LUFKIN

LUFKIN-COOPER-BESSEMER

LUFKIN OIL FIELD AND INDUSTRIAL

INDUSTRIAL SPEED REDUCERS

DIVISION LUFKIN FOUNDRY & MACHINE COMPANY

Drill-Stem Testing Methods Move Ahead

PVT Analyses on Fluid Samples Provide Data Once Not Available Before Well Completion

By J. E. SMITH, Vice President

Johnston Testers, Inc., Houston

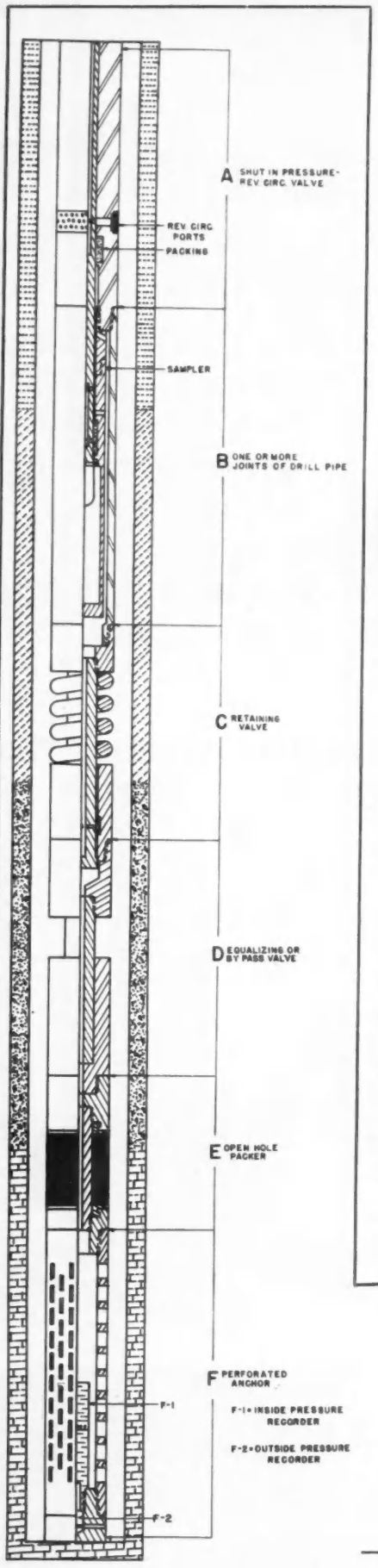
CONSIDERABLE progress has been made since January, 1949, in taking reservoir fluid samples in conjunction with drill-stem tests. These samples, many of which have been completely analyzed for PVT data, have been compared with subsequent subsurface samples taken in the conventional manner after completion of the well. The study and comparison of these data establish the advantage of obtaining a representative subsurface sample of reservoir fluid in conjunction with taking a drill-stem test either in open hole or when making a production test inside casing.

The desirability of taking a subsurface reservoir sample on the drill-stem test is to provide vital reservoir data from the first fluid recovered or produced. A sample obtained on the open hole test is virgin fluid and afford the advantage of analysis weeks sooner than conventional methods of sampling the well after completion. It also provides data for initial reservoir study before or immediately following the completion of the well.

When experimentation began, there was considerable doubt that a successful sample could be obtained on open hole tests due to the relatively short time interval the producing zone is allowed to produce. However, factual data indicate that a representative subsurface fluid sample may be obtained in most formations, if the formation is allowed to produce 40 or more barrels of oil. The ability to take the sample at equilibrium pressure was made possible by the action of closing the well in immediately above the packer. Due to the very small volume involved, equilibrium pressure was reached very rapidly. When closed in at bottom, the time interval required for the formation to reach equilibrium pressure was usually 20 to 40 minutes, depending on the type of reservoir being tested.

Production tests taken inside the casing afford a much longer flow period and consequently more ideal conditions for recovery of a representative subsurface fluid sample. The same auxiliary equipment is used when taking a test inside casing as that used in open hole.

Experience gained in the recovery of several hundred samples has provided the basis for a successful operating technique. The two basic types of reservoirs, saturated and undersaturated, require different procedure



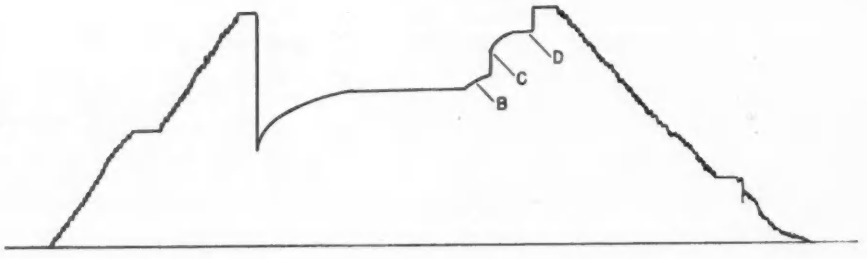


FIGURE 1 (right). Bottom-hole pressure chart on production test.
FIGURE 2 (left). Location of component parts of standard open-hole drill stem testing assembly.

About the Author

J. E. SMITH, vice president in charge of engineering and sales, Johnston Testers, Inc., has been concerned with reservoir sampling and drill-stem testing since 1939, when he joined the Johnston organization, as a well tester. He has had experience in numerous major oil-producing regions in the U. S. In 1945 he became associated with engineering and sales work, assisting in the design and field testing of new equipment, and working out suitable testing procedure. He was made a vice president on December 1, 1951. He started as a roughneck in 1929 after studying mechanical engineering at Louisiana State University. He is a member of the API, the Houston Geological Society, has presented papers before the AIME, and has written several papers on drill-stem testing.

in recovering a representative subsurface sample. The saturated reservoir requires very careful handling in sampling due to the relatively high bubble point pressure, and the possibility of recovering a two-phase sample. An effective procedure followed in sampling the saturated reservoir is to close the well in at the surface for 30 minutes prior to closing the shutin pressure valve on bottom. This practice allows any existing gas interface to rise above the point near bottom or above the location of the subsurface shutin pressure valve. Another advantage of first closing the well in at the surface is to allow the fluid column in the well bore opposite the producing zone to become more stabilized than is prevalent while the well is flowing. The procedure outlined is a precautionary measure against the recovery of a two-phase sample, and has proven very effective in field use.

At the conclusion of the 30-minute time interval after closing in the well at the surface, the subsurface shutin valve (Part A of Figure 2) is closed. Since the subsurface shutin pressure valve (A) is located so near bottom, the volume is very small and reservoir pressure rises rapidly to equilibrium pressure. The sample is taken at the conclusion of the shutin pressure period at equilibrium pressure. Figure 1 is a reproduction of a chart from a depth pressure recorder where the above outlined procedure was used. Point B indicates the moderate rise in bottom-hole pressure occasioned by closing the well in at the surface. Point C indicates the rapid increase to equilibrium pressure when the subsurface shutin pressure valve is closed, and Point D is the point at which subsurface fluid sample is trapped.

Procedure used in the under-saturated reservoir is similar with the exception that the well is not closed in at the surface.

The sample unit now in use recovers a sample of 1300 cubic centimeters. This quantity of fluid is more than ample for standard laboratory analysis and provides sufficient excess fluid for rechecking any phase of the analysis should it be desired to do so.

The subsurface sampler serves a very useful purpose in drill-stem testing practices now in general use, and provides additional data that are necessary to make quantitative calculations to evaluate more accurately the productive ability and subsequent behavior of the reservoir tested.

Use of subsurface samples are many. The use of the sample for complete laboratory analysis required for extensive PVT data is limited to wildcat or other special wells due to the high cost of such an extensive analysis.

Popular application of fluid sampling is to make a more condensed group of measurements as follows:

- Compressibility factors of saturated reservoir oil over three pressure ranges.
- Density and specific volume of the reservoir oil at bubble point conditions.
- Bubble point pressure of reservoir oil at reservoir temperature.
- Formation volume factor from flash vaporization at atmospheric pressure and temperature.
- Solution gas/oil ratio under condition of Item 4.
- Gravity of residual oil under conditions of Item 4.
- Viscosity of residual oil from test in Item 4 at two temperatures.
- Specific gravity of gas liberated during test of Item 4.

Figure 4 is a device consisting of a miniature separator equipped with gauges and thermometer, pressure regulator and wet test meter reading in thousandths of cubic feet with the sample unit connected. This unit is used at the well site immediately following a drill-stem test to determine the bubble point pressure, at atmos-

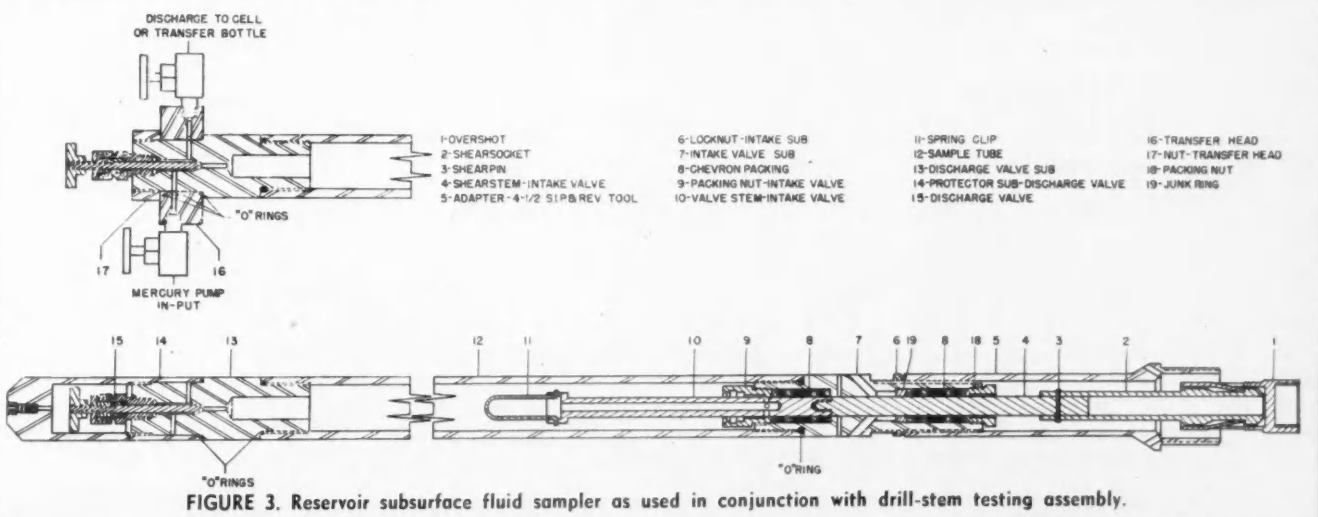


FIGURE 3. Reservoir subsurface fluid sampler as used in conjunction with drill-stem testing assembly.

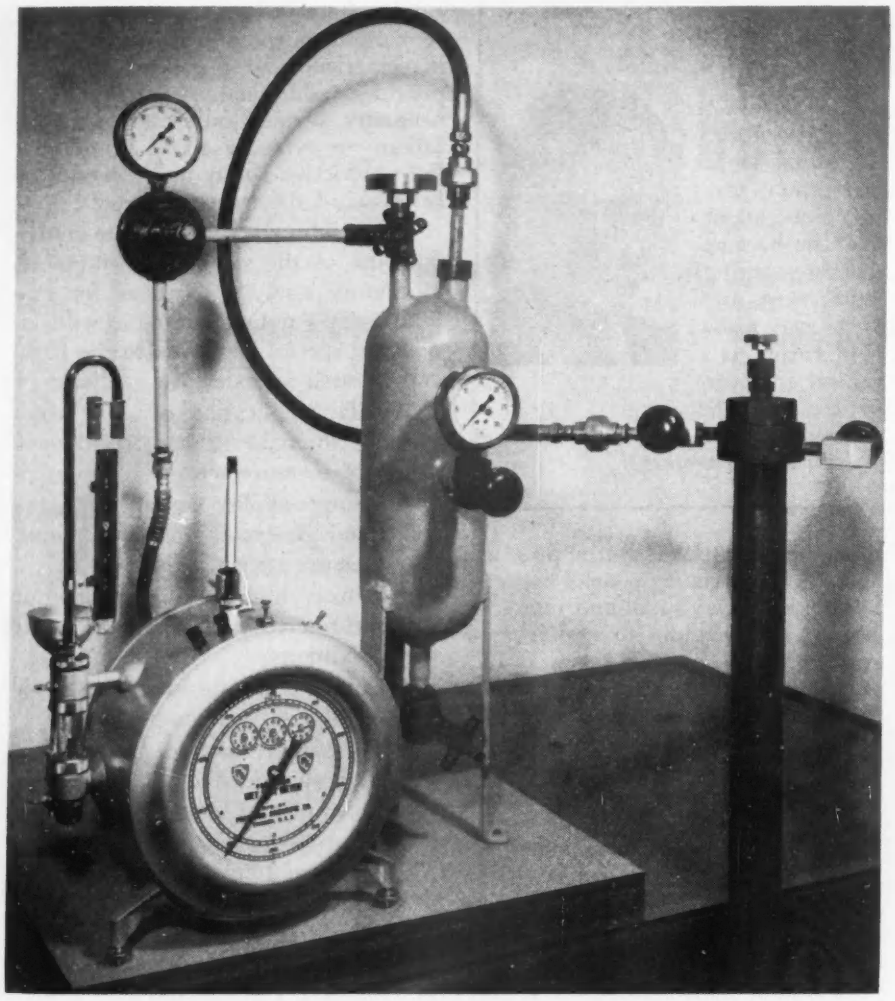


FIGURE 4. Field unit for determining gas-oil ratio and other data on samples recovered on drill stem test.

pheric temperature, gas/oil ratio and measurements on the residual oil when laboratory measurements are not required.

The sampler is also used to recover subsurface samples of formation water. A sample obtained in this manner affords a more accurate analysis of formation water since all gasses and chemical elements present are retained in the sample. It is of material aid in water study programs.

Sampler and Testing Assembly

Figure 2 is a diagram of the testing assembly ordinarily used in making drill-stem tests in an open hole. Component parts are named and shown. The fluid sampler is connected to the lower end of the shutin pressure valve, Part A, and is suspended in B, one or more joints of drill pipe.

During the flow period, the sampler is closed and isolated from the well fluid. The shutin pressure valve, A, actuates the sampler and opens it when going into shutin pressure position. The sampler remains open during the entire shutin period and is closed at the conclusion. Upon closing the sampler it is disconnected from any further manipulation of the shutin pressure valve by shearing a small brass pin. The intake valve of the sampler is thus locked in a closed position and has no further function.

Figure 3 is a detailed drawing of the sampler unit. The inset at left illustrates the fluid transfer head attached to the unit.

Upon removal from the well following a test, the sampler is disconnected at Point 6. Part 13 is the discharge end. Protective bull plug, 14, is removed and the transfer head is installed. Part 15 is the master discharge valve. The transfer head is equipped with two high-pressure one-fourth-inch needle valves, one is used as input for the mercury pump, the other, for discharge.

The fluid sample may be transferred to a shipping bottle or the entire unit shipped to the laboratory. In most instances, the unit is shipped to the laboratory and test fluid removed as needed. This eliminates the possibility of leakage or contamination in field transfer.

Limestone Production Hiked

■ CONTINUED FROM PAGE 174

wells to water injection has averaged only approximately $6000.

Flood Area Extended

Based on encouraging early results obtained from the pilot area, the flood was extended to include the entire 1100 acres of the pool operated by Continental Oil Company. On Jan. 1, 1952, a total of 22 injection wells were in operation.

An estimated 624,964 barrels of additional oil had been recovered as of Jan. 1, 1952. At that date, a cumulative total of 3,260,216 barrels of water had been injected into the Hunton limestone reservoir.

As of that date, the area under flood was producing 1420 barrels of oil and 1890 barrels of water per day. It is estimated that 1320 barrels is the daily volume of oil attributable to flooding.

The 22 injection wells were formerly oil producers and required no surface pressure for water injection. Fourteen of these wells are equipped with teleflood meters, and utilize brine produced from upper perforations in a section of the Kansas City limestone at an approximate depth of 2450 feet. Five wells receive fresh water obtained from shallow water wells, and produced water is being injected into the three remaining wells.

Injection rates vary from 70 to 480 barrels per day per well with the high volumes injected on the flank of the structure.

Results of the five-year operation of this pilot water flood have shown that enough additional oil has been obtained to warrant greater consideration of water flooding as a means of increasing oil recovery from essentially depleted, solution gas drive limestone or dolomite reservoirs. A few points of importance are outlined which should be considered in determining the susceptibility of a similar limestone reservoir to increased oil recovery by water flooding:

- An expensive pilot flood development program to obtain water injection and producing wells should be avoided.
- The injection of water into wells which have produced large volumes of formation water should be avoided because of the probable low residual oil saturation in most permeable streaks.
- Sufficient information should be available to indicate that most

6 reasons why you should choose

PELTON

long stroke hydraulic pumping jack

a better way to pump an oil well

Over twelve years' experience by major and independent oil producers with hundreds of Pelton Long Stroke Hydraulic Pumping Jacks reveals unprecedented records in oil production and in low cost pumping.

Analyzing results of these Pelton installations which are largely in Texas, Oklahoma and California fields, the following six advantages were gained with stroke lengths from 10 - 30 ft:

1. **SIMPLICITY OF SUCKER ROD PUMPING RETAINED.**
2. **INCREASED OIL PRODUCTION through Pelton Long Stroke.**
   Bottom hole pump efficiency increased.
   Pumps with 4-6 times greater capacity can be used.
   Greater effective stroke. Less stroke loss due to rod stretch.
3. **REDUCED WELL MAINTENANCE through Pelton Long Stroke.**
   Sucker rod failures reduced as much as 95%.
   Bottom hole pump life increased.
4. **REDUCED DOWN TIME through Pelton Long Stroke.**
5. **REDUCED INSTALLATION COST.**
   Low weight—no vibration.
6. **3 - 12 MONTHS PAY OUT.**

PELTON—hydraulic engineers for over 72 years originally pioneered and today lead in the field of Long Stroke hydraulic pumping. Combined with an industry-wide service organization the Pelton Long Stroke Hydraulic Pumping Jack is the accepted method for pumping the deeper wells and the shallower wells with heavy potentials.

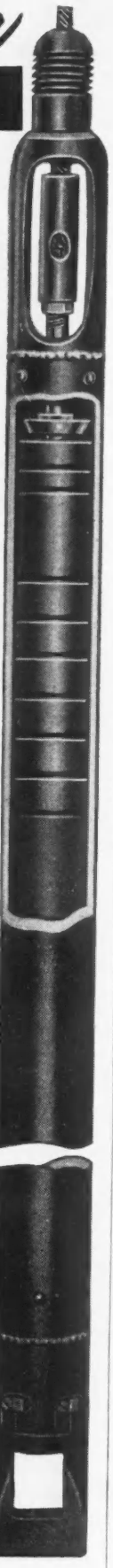
Get complete facts from Pelton catalog—yours for the asking.

THE PELTON WATER WHEEL COMPANY

Subsidiary of Baldwin-Lima-Hamilton Corp.
Oil Industry Machinery Division
2447 East 54th Street, Los Angeles 58, California

Los Angeles–San Francisco–Avenal–Dallas–Houston–Odessa–New York City–Philadelphia

Miller SAND PUMPS



In every major producing area where sand or sediment is a problem, you'll find Miller Sand Pumps and Bailers are standard . . . the leaders in clean-out equipment. For 26 years Miller has held this leadership, with continuous improvements and faithful service.

The Miller Sand Pump is made in regular and heavy duty types in sizes listed below. Lug type, chisel, sand and bailer bottoms are easily interchanged.

SAND PUMP and BAILER SIZES

Outside Diameters

2½"
3"
3½"
4¼"
5"
5½"
7"

Lengths

20 feet
25 feet
30 feet

Special Sizes and Lengths Made to Order!

Write for new descriptive price list on Miller Sand Pumps and Bailers. See Composite Catalogue Page 3305 for details.

MILLER SAND PUMP CO.

1524 S. E. 29 St. . . . . Box 4516

OKLAHOMA CITY 9, OKLAHOMA

of the permeable zones in the injection well are in communication with permeable zones in adjacent producing wells.

- It is believed that water injection into a limestone or dolomite having fractures will invade only a small portion of the pore space. However, it is possible that the displacement of residual oil from only the fractures may still yield sufficient oil recovery to justify water flooding.

Much remains to be learned about water flooding of limestone and dolomite reservoirs. Since a more erratic permeability profile than is found in sandstone has to be contended with, it seems logical to assume that rate of water injection will be an important factor that must first be determined by individual well conditions and experiment. Reliable core data and electrical logs, together with laboratory and field experimental data, will serve as useful guides. Use of pattern flooding as compared to line flooding for best recovery efficiency, together with time involved for economic depletion, also will receive consideration.

It is hoped that this project will stimulate the use of water floods in other essentially depleted limestone and dolomite reservoirs. Not only would additional floods advance technical knowledge, but it is believed that sizable quantities of formerly nonrecoverable oil would also be added to the secondary oil reserves of the nation.

ACKNOWLEDGMENTS

The authors acknowledge the assistance of the production and geological departments of Continental Oil Company. Appreciation is also expressed to the management of Continental Oil Company and its partners in this water flood operation for permission to publish this paper. That part dealing with the pilot flood was adapted from an original paper entitled "Preliminary Results of Pilot Water Flood Operations in Hunton Limestone, Graber Pool, Kansas" by the same authors and presented before the AIME in New Orleans, October 4-6, 1950.

BIBLIOGRAPHY

WORLD OIL—"Interesting Turner Valley Water Flood Experiment," January, 1949.

Taliaferro, D. B.; Keithly, C. M.; and Jennings, Thomas: Report of Investigations 3778, U. S. Bureau of Mines.

OIL WEEKLY—"Illinois Limestone Successfully Flooded," April 23, 1945.

Horner, W. L.—"Pressure Maintenance by Water Injection, Midway Field," *Arkansas Petroleum Engineer*, February, 1946.

Trube, Albert S., and DeWitt, Sam M.: "Primary Pressure Maintenance with Water Injection in New Hope Field, Franklin County, Texas," *Oil and Gas Journal*, Dec. 8, 1949.

Ervin, P. S.: "Results of Experimental Water Flooding in the Haynesville Field, Pettit Zone, A Lime Reservoir Originally Under Dissolved Gas Drive," API, Amarillo, Texas, May 22-23, 1947.

Water Injection into Crinoidal Limestone, Todd Field, Crockett County, Texas, (Personal Communication).

Meslage, Fred J.: "Gas Injection in Dolomite Reservoir, West Pampa Repressuring Association Project," API, Tulsa, March 23-25, 1949.

Bulnes, A. C., and Fitting, R. U., Jr.: "An Introductory Discussion to the Reservoir Performance of Limestone Formations," AIME, Petroleum Development and Technology, 1945.

"Secondary Recovery of Oil in the U. S." (Second Edition), API.

Water Injectivity Profiling

• CONTINUED FROM PAGE 180

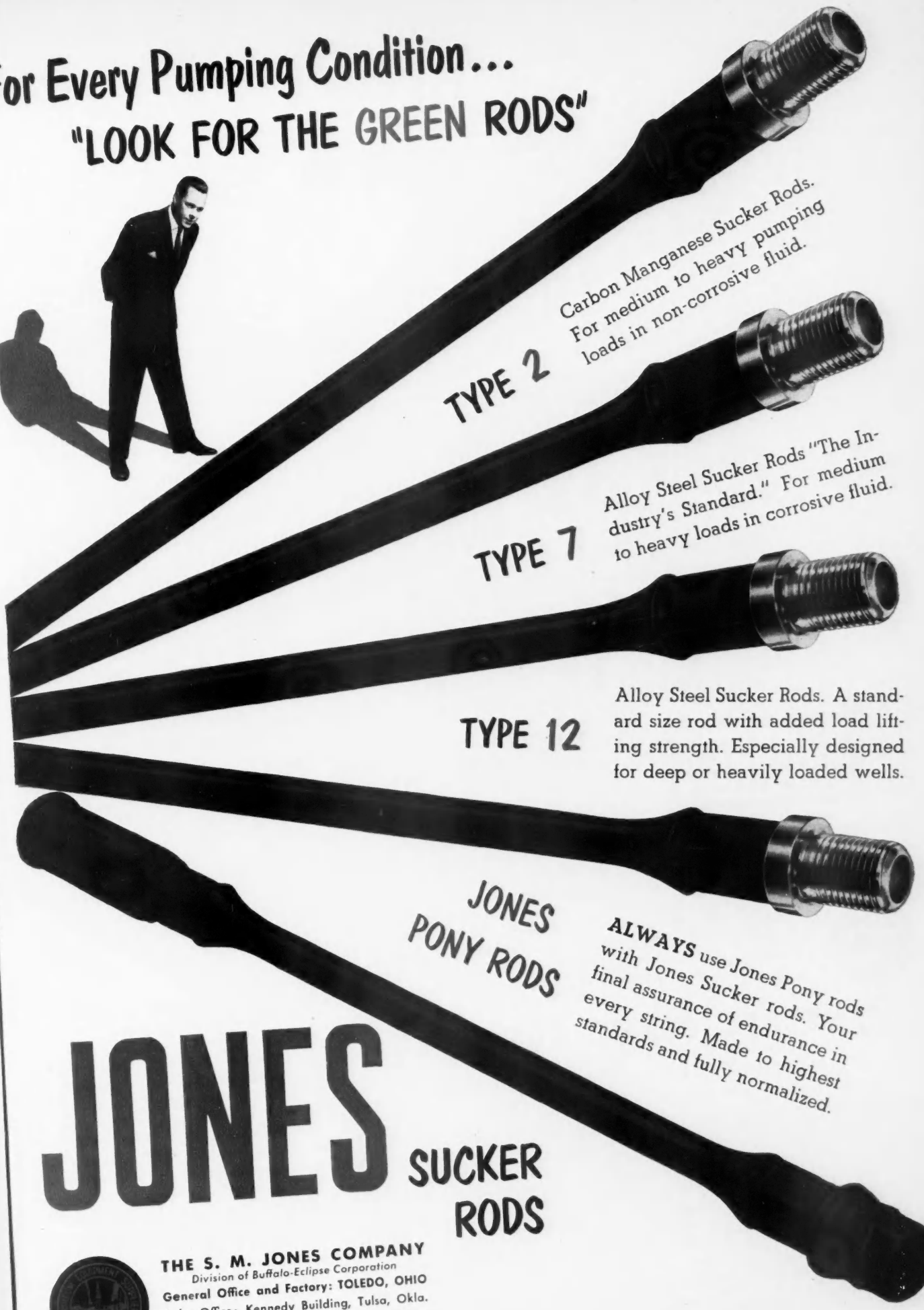
through a five-inch gate valve with a packing gland around the cable. Under these conditions the over-all accuracy of measurement is upset by the interruption of the input flow because of the time required to install the equipment. It is much easier and more accurate to work with wells which flow under gravity where this interruption is not necessary since the disturbance of equilibrium may require waiting a day or so before the well is back to normal. This interruption is necessary with most actual or proposed systems of measurement Figure 3 shows the input profiling instrument. The instrument panel and controls for the flowmeter, caliper and other logging systems are shown in Figure 4.

Field Applications

Results obtained from a practical application of the flowmeter observations are shown in Figure 5. This figure contains a reproduction of two typical injectivity profiles. Flow data for these profiles were obtained by making flow observations at 2- and 5-foot intervals in the uncased formation at the bottom of an injection well in the North Burbank pilot flood area of Osage County, Oklahoma. The profiles show the vertical distribution of the flood water as it flows into the 60-foot thick production zone. Such profiles have been obtained on all nine pilot flood wells and each profile illustrated is a sample essentially similar for all nine wells. The producing sands do not show continuity from well to well either by comparison of cores or electrical logs. The sands are considered to be overlapping beach ridges. Measurements show that the permeability of these sands is much more variable than their porosity. It should be noted that the resistivity log with eight-inch spacing is much smoother than the permeability log. In this field the permeability often varies substantially within the one-foot intervals from which the one-inch permeability test samples were taken. This has led to the belief that lateral variations are also irregular on a small scale.

Principal feature of the injectivity log is the lack of correlation with the permeability of the plugs taken from a complete core of the producing sand at one-foot intervals. This means that the injectivity at any level is a

For Every Pumping Condition...
"LOOK FOR THE GREEN RODS"



TYPE 2 Carbon Manganese Sucker Rods. For medium to heavy pumping loads in non-corrosive fluid.

TYPE 7 Alloy Steel Sucker Rods "The Industry's Standard." For medium to heavy loads in corrosive fluid.

TYPE 12 Alloy Steel Sucker Rods. A standard size rod with added load lifting strength. Especially designed for deep or heavily loaded wells.

JONES PONY RODS **ALWAYS** use Jones Pony rods with Jones Sucker rods. Your final assurance of endurance in every string. Made to highest standards and fully normalized.

JONES SUCKER RODS

THE S. M. JONES COMPANY
Division of Buffalo-Eclipse Corporation
General Office and Factory: TOLEDO, OHIO
Sales Office: Kennedy Building, Tulsa, Okla.
Export Sales Office: Buffalo International Corp.
50 Church Street, N. Y. C.

sample of a quantity with large random statistical fluctuations and that the vertical permeability probably equalizes the flood front only a short distance from the well bore. The lack of agreement between the injectivity and permeability as measured suggested further core tests. Two sets of three permeability plugs taken from the center and opposite sides of a 4.5-inch core showed considerable variation, by a factor of three in one case and by a factor of 1.29 in the other case. While this is too small a sample to estimate the range of variance of such plugs it gives support to the hypothesis suspected from the logs, that the variation in horizontal and vertical permeabilities are of the same order of magnitude.

The first injectivity profile was taken after 30,000 barrels of water had been injected, the second after 250,000 barrels. The shift in the injectivity shown in Figure 5 is typical of other wells of the pilot flood.

The change in injectivity means that the paths of least resistance to flow changed. Under the hypothesis of quite large vertical and horizontal random variations in permeability over intervals of the order of one foot, the change in resistance to flow required to alter the injectivity profile would be much smaller than would be the case for purely horizontal flow.

It is not possible at this writing to ascribe the change in injectivity to any one of many possible causes. The change may be due to an increase or decrease in clogging. It may be due to an increase in relative permeability by removal of residual oil by direct drive or leaching of oil-wet portions of the sand by the large volume of water flowing near the hole face. It may be due, in part, to changes in back pressure due to fill-up and to the compressibility of gas held in the sand pores.

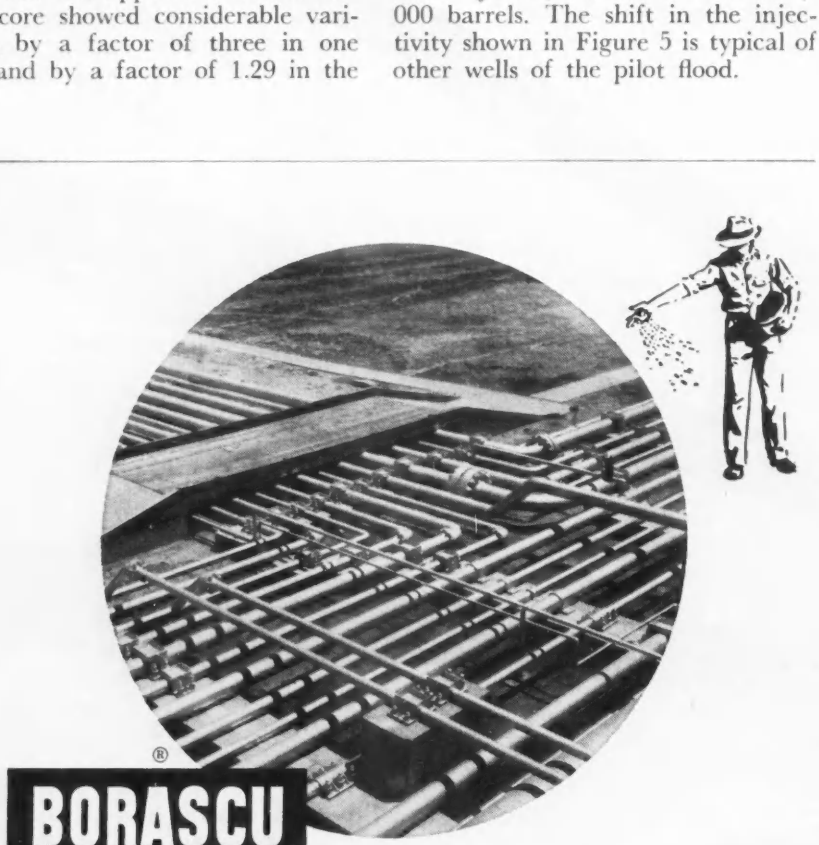
It is anticipated that further information to aid in interpretation will be obtained by measuring the back flow profile when the water input pressure is reduced. This can be done most easily when the wells require pressure at the surface. This condition is now just beginning to be adequate for such a test. At present, it is thought that a small-time interval of backflow will indicate probable points of clogging by a comparison of the injectivity before and after the backflow. However, it is thought that the distribution of occluded gas in the sand will affect the back flow profile particularly toward the end of the flow.

It can be seen from the results so far that, in addition to the location of thief zones which should be sealed off, the injectivity profile with certain supplementary information may show that sealing off other zones taking more than their share of the water would be ill advised. This situation arises when adequate vertical permeability exists to maintain a uniform flood front.

The instrument has been used on a number of occasions to find casing leaks and to check the casing seat for entry (from upper sands) or loss of water. There are simpler instruments for measuring casing leaks, but at the casing seat it is an advantage to have the brush packer take care of the possible change in hole diameter.

ACKNOWLEDGMENT

The authors acknowledge the important contributions made by others of the Research and Development department to the development of the flowmeter system. The authors also wish to express appreciation to members of the Production department in Bartlesville and at Shidler, Okla., for cooperation and assistance in in conducting field tests, and to Phillips Petroleum Company for permission to publish this paper.



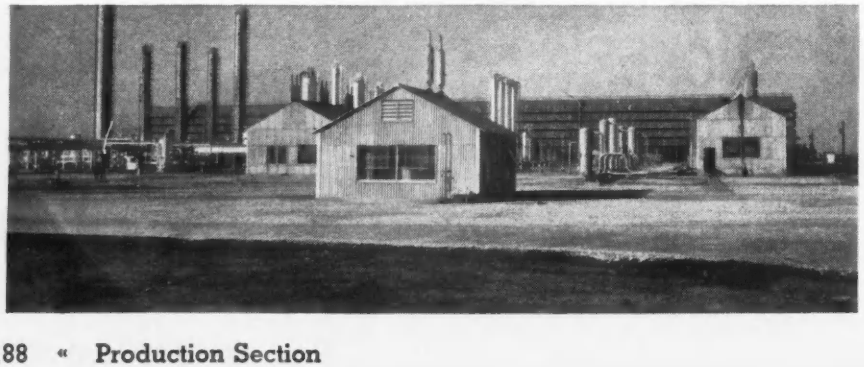
BORASCU®
WEED KILLER

NONCORROSIVE*• NONPOISONOUS
*To Ferrous Metals
NONFLAMMABLE • NONSELECTIVE

Removal of weeds and grasses need not be a costly problem! Borascu, when properly applied, will destroy weeds and grasses with its effective root-action; yet it is safe, inexpensive and easy to use. Removing undesirable vegetation by old-fashioned methods such as hoeing monthly, or quarterly, is an extravagant waste of manpower and money. Be thrifty ...use Borascu; a single application may keep an area cleared for 18 to 24 months!

WRITE FOR LITERATURE

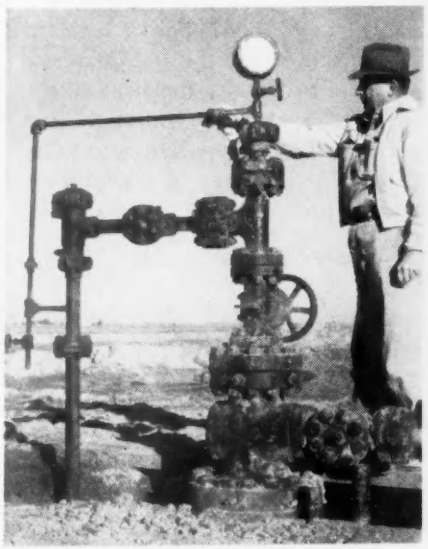
PACIFIC COAST BORAX CO.
DIVISION OF BORAX CONSOLIDATED, LIMITED
630 SHATTO PLACE • LOS ANGELES 5, CALIFORNIA
DISTRIBUTORS LOCATED THROUGHOUT THE OIL FIELDS OF U. S. A. AND CANADA



Device Permits Bypassing Choke

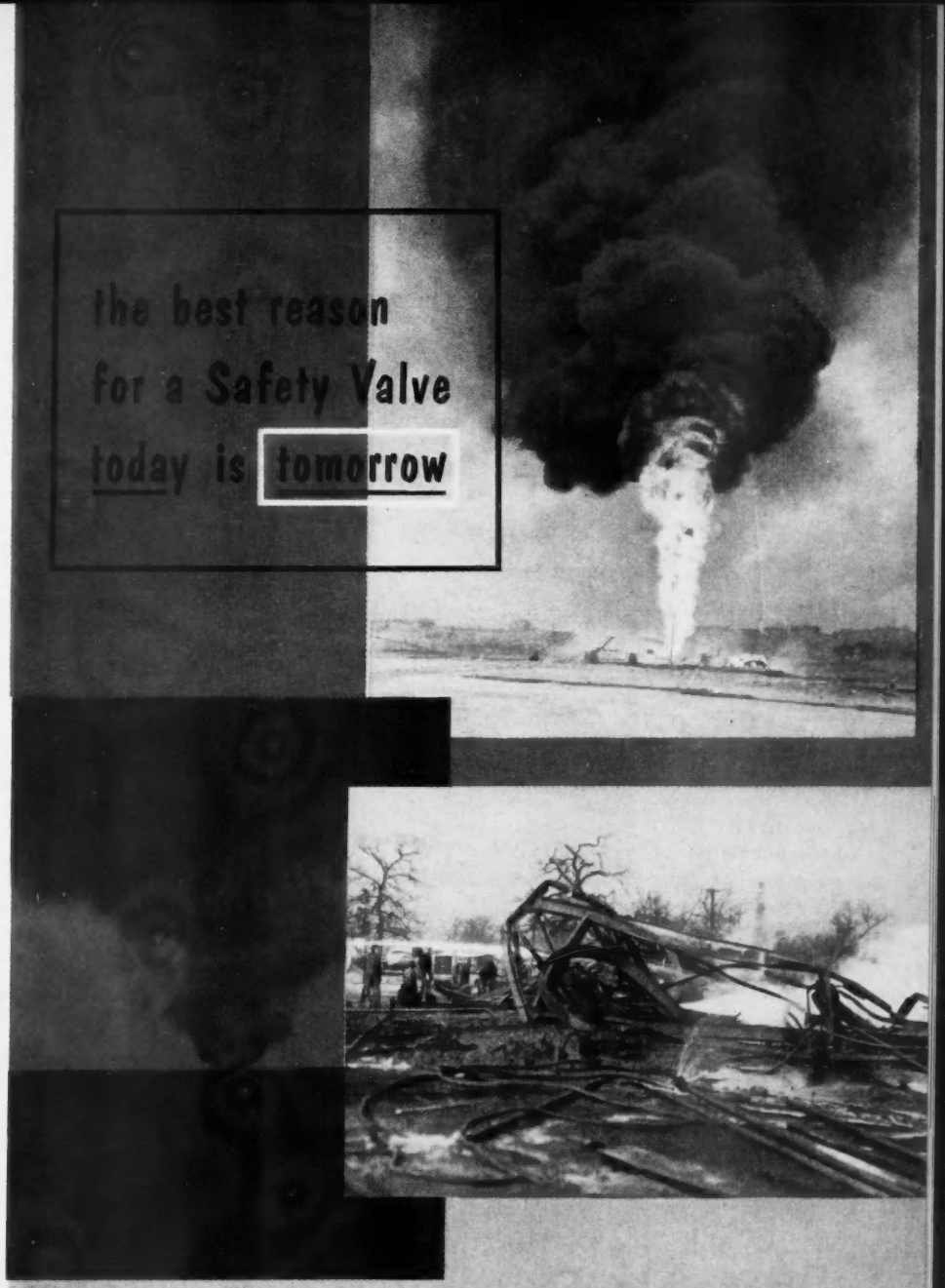
On weak wells which are apt to load up with water, or wells where the bottom hole pressure is low, it is sometimes necessary to relieve the wellhead pressure so that the tubing pressure will build up to allow the well a chance to stabilize. This is especially important on new wells where the perforations are not open or where the wash water has not all been eliminated.

A simple, manually-operated bypass around the choke bean may be installed so that the pumper can bypass the choke for a short period, and also catch a sample of the material being unloaded from the well. A connection for taking samples is placed just below the choke bean with a tee screwed on bull-headed. The lower



side of the tee is fitted with a valve and nipple that remain closed except when a sample is being caught or when the well pressure is too weak to buck the separator pressure.

The upper side of the tee is connected through a gate valve to a tee just below the pressure gauge on the tubing head. When the well is being washed in, a small choke is placed in the bean and the bypass valve opened. Once the well begins flowing on its own, the bypass is closed until the well tends to load up; it is then opened for short intervals and samples are taken at the sample cock. Once the well is stabilized, and it is found unnecessary to open the bypass valve, it can be moved to another location.



Otis "Storm Chokes" protect your production 24 hours a day — *fully automatic,* thoroughly dependable *sub-surface* shut-off of wild, uncontrolled flow of high-pressure wells. Otis Tubing Safety Valves allow the flow to follow a single, straight course under normal production pressures. The instant surface connections fail and the upward thrust of the pressure differential across the valve exceeds the valve spring compression, the tool automatically snaps to a positive shut-off. After surface connections have been repaired, the safety valve can be reopened by equalizing the pressure across it. An Otis Tubing Safety Valve Cage Assembly can be made up and landed with Types S, J, or B Otis Locking Mandrels and run or pulled, under pressure, on a wire line with standard Otis running and pulling tools. If you have high-pressure flowing wells in areas subjected to seasonal storms, or near schools, highways, or in other vital locations, you need the positive protection of an Otis Safety Valve. For full particulars and an illustrated bulletin on the entire line of Otis Safety Valves (tubing and surface), write us at Box 7206 in Dallas, or contact the Otis office in **Houston, Corpus Christi, Longview, Victoria, Falfurrias, Odessa, New Iberia, Shreveport, Houma, Oklahoma City, or Elk City.**

PRESSURE CONTROL — OTIS — SERVICE — EQUIPMENT

Otis Tubing Safety Valves

OTIS PRESSURE CONTROL, Inc. • DALLAS

How to do it! PRODUCTION HINTS

$10 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas.

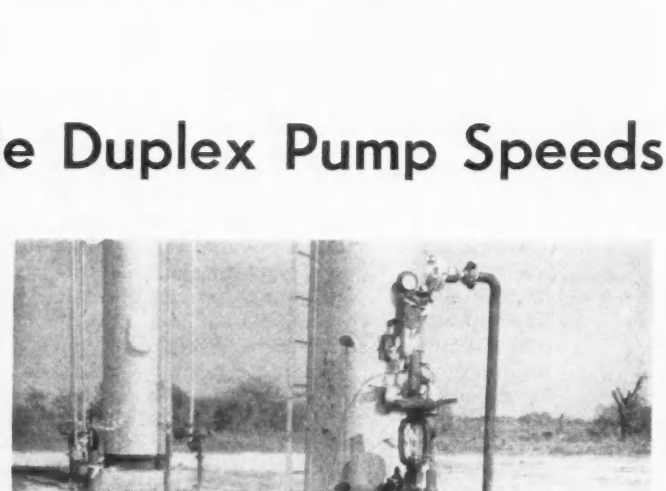
Special Trap Removes Pipe Scale from Crude

Pipe scale, sediments and foreign particles, as well as salt water, have been removed from crude in a gathering system by means of a specially-constructed trap. This device consists of two nearly-horizontal sections of pipe, one above the other, and interconnected by vertical legs as shown. A filtering medium placed inside a wire mesh flat cage and inserted the full length of the upper casing served to knock out scale particles and sediments that get into the oil stream.

The unit illustrated is about 16 feet long. The upper section containing the filter is of 16-inch diameter pipe while the lower pipe is 10 inches in diameter. The connecting legs, welded on two-foot centers, are eight-inches in diameter. This lower segment slopes gently to the right so that entrained water separated can be removed from the trap. Small baffles, welded across the bottom of the upper section where the risers are attached, were inclined toward the direction of oil flow, which in this case is from left to right through the trap.

The wire mesh cage, extending the full length of the 16-inch diameter casing, contains jute as the filtering medium. It can be removed by unbolting the two rectangular flanges at either end. Oil enters the trap below this filter through an eight-inch line as shown. It discharges from the trap on top at the far end. Valves in each line provide a means for shutting off the trap for cleaning and inspection. Oil is bypassed in this instance. The unit was set on three sections of timber which form a simple foundation.

Portable Duplex Pump Speeds Tank Cleaning

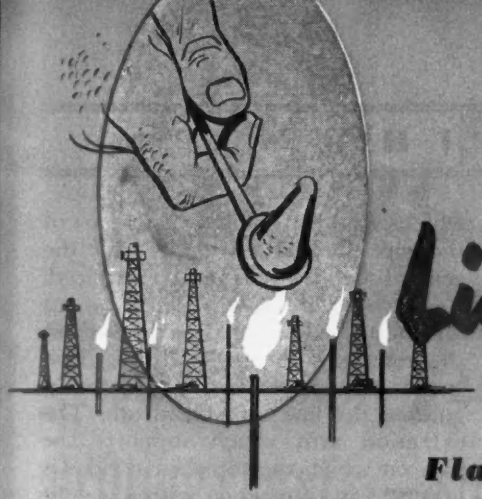


On leases where it is seldom necessary to circulate tank bottoms, a portable pump may be used for the job if the tank battery piping is arranged to accommodate it. By using a small, duplex pump, the pumper or head roustabout can carry it in the back of the lease car or truck.

It is connected up with one-inch hoses for the suction and discharge and uses three-eighths-inch copper tubing to hook up the gas supply which is used to energize the pump.

When the tank battery is first laid out, the bleed line from all of the tanks passes near the separator so that the bottom of the separator can also be tied into it. A connection near the separator is made with a plug valve attached, looking up. A tee is placed in the line leading from the separator to the heater-treater, and a naked plug valve installed on this. Finally, a separate connection is made on the bleed at the bottom of the gas scrubber on the separator controls so that the gas for power is available.

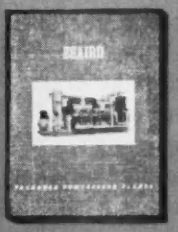
In operation, the pumper unloads the pump to the ground, connects the intake, connects the discharge to the line leading to the heater-treater, and hooks the copper tubing to the gas line. The pump circulates the high bottom through the heater and back into the tanks.



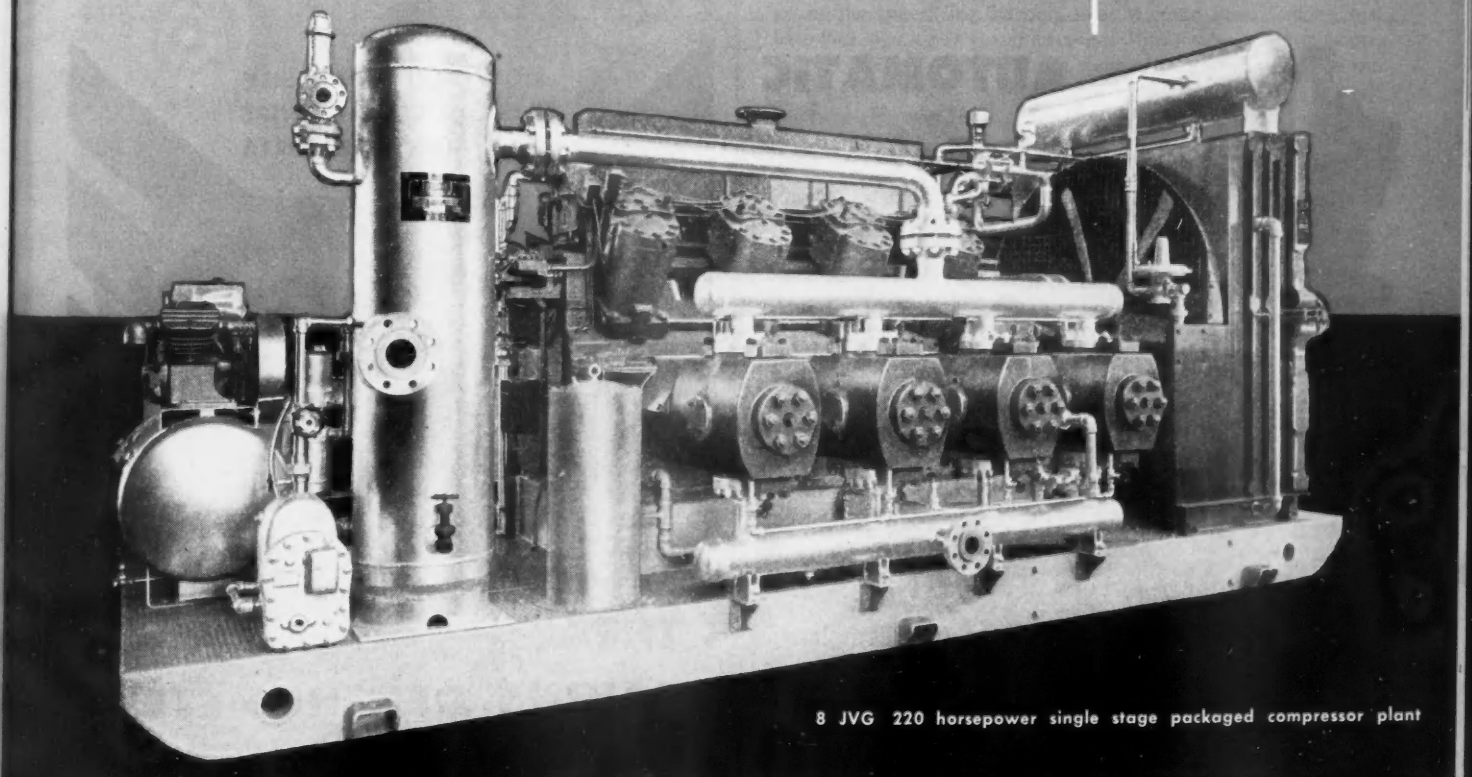
Lights Out ON THE FLARE STACKS

Flare Gas Has Gone To Work

Gas flares, which formerly marked oil and gas fields, are becoming a thing of the past. The gas which fed the flares has been put to work, in gas lift operations, gas distribution pipelines and secondard recovery systems. A major contribution to this utilization of flare gas has been made by the development of Beaird-Ingersoll-Rand packaged compressor plants. These are *complete plants — completely packaged.* They are specifically designed to meet the requirements of a portable field compressor station which is easy to install — simple to operate — adaptable to changing field conditions — and which can be moved to new locations with minimum re-installation expense. Today, over two hundred Beaird-Ingersoll-Rand packaged compressor plants, with a total of over one-half million horsepower, are in operation in fields from coast to coast.



Let us send you our new booklet on the Beaird-Ingersoll-Rand packaged compressor plant.



8 JVG 220 horsepower single stage packaged compressor plant

THE J. B. BEAIRD COMPANY, INC. SHREVEPORT, LOUISIANA

L.P.G. SYSTEMS

CAST STEEL FITTINGS

ANHYDROUS AMMONIA EQUIPMENT

PRESSURE BULK STORAGE

MACHINING
FABRICATING
STEEL WAREHOUSE

SINCE 1918
BEAIRD
SHREVEPORT

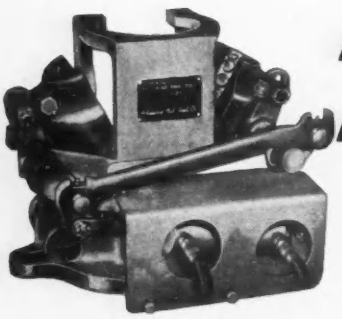
LOWEST COST PER HORSEPOWER, INSTALLE

Innovations Aid in Scraping

Several helpful features of this paraffin scraping unit add to the efficiency of its operation and ease the job of the operator. The wire drum is driven through a hydraulic transmission that can be engaged and disengaged from the operator's position at the wire line drum. A hydraulic pressure gauge mounted within easy vision of the operator indicates the amount of torque on the drum. This small pressure line also includes a pressure relief valve. Should the scraper suddenly become stuck before the operator can slow the engine down, this valve would release the excess pressure to lower the pulling torque on the wire line.

The drum has a flanged divider which permits using only that part of the wire line that is required for the general depth wells to be serviced. As the wire line wears, it can be cut off and the additional line spooled off the reserve side of the drum. Two spooling sheaves aid the operator in guiding the line into the drum. The extension arm which supports the axle on which the top sheave rides is also used in connection with a weight indicator to measure the relative amount of pull on the line. However, the line is at a convenient height for the operator to guide it with the aid of a split section of discarded garden hose. Both sheaves are floating, that is, they are free to move from side to side, with the bottom sheave following the top one when reeling the line in.

A unique method of rope storage has been provided at the rear of this unit. Note the shop-made reel suspended below the truck bed. It was made from a section of four-inch pipe and flanged at either end. A handle on the near end makes it easy to wind in manila rope when making ready for another well.



AUTOMATIC Air-Powered TUBING SPIDER

(Pat. Pend.)

The ADVANCE is designed and built to meet every specification that should be required of an air-powered tubing spider.

Write us for your copy of catalog No.TS-52. It illustrates and describes how no detail has been overlooked to make this the finest tool of its kind.

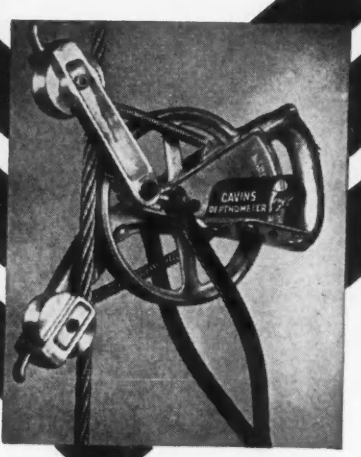
Advance Oil Tool Co.

2853 Cherry Ave., Long Beach 6, Calif. Ph. 485-64

Export Rep. Roland E. Smith

Mid-Cont. Rep. Hillman-Kelley.

NOW YOU CAN EASILY TAKE ACCURATE WIRE LINE MEASUREMENTS



THE CAVINS DEPTHOMETER

will tell you where bottom is in little more time than it takes to make a trip with your bailer Gives you accurate depth in plain figures—compensates for raising and lowering tools when feeling for bottom. Strong, light-weight, easily used, and priced right Send today for illustrated folder.

THE CAVINS CO.

MAIN OFFICE AND FACTORY

2853 Cherry Ave., Long Beach 6, California, Phone 4-8564

Branch Offices: Ventura – Santa Maria – Bakersfield – Taft

Which man are you?

here's how *Tuboscope* can help you reduce drilling costs – stop pipe failures – cut production expenses

MANAGEMENT "With Sonoscope inspection we know we're getting full use out of each length of drill pipe. And the more footage we can get from each length the more we save. Then, too, the chance of twist-offs is almost nil, and that means less expense from downtime. Our cost per foot now is actually down from what it used to be, even with the generally rising cost of doing business."

DRILLING "We add on drill collars and then open up on the speed. It's the only way to make time. Drilling fast like that you can't guess at pipe. That's why we Tuboscope our new pipe for mill defects, and of course, Sonoscope our used pipe regularly. It pays off in faster drilling, no downtime for twist-offs and fishing. And I don't get eaten out for being behind schedule. We use Tube-Tectors, too, because they don't move on the pipe."

PRODUCING "We know from our Tuboscope inspection that the tubing and casing are good when they're first run in the hole. They can tell us, too, the exact condition of the inside of the tubing in the well, fast and without killing the well, with caliper surveys. When we do pull tubing we know which lengths to keep and which to scrap. Tuboscope's complete wire line services keep our wells flowing at lowest cost and with least downtime."

Call Your Tuboscope Man Today for the Full Story

Sonoscope - Tuboscope - Tube-Tector Pipe Protectors - Wire Line Services

TUBOSCOPE COMPANY

2400 HOLMES RD. • HOUSTON, TEXAS

Tuboscope

Sonoscope and Tuboscope are registered U. S. Trade Marks

Simple Drum Hookup Tests Well Productivity

A simple well production test can be run with only a metal drum, a stop watch, a ruler and a section of flow line. It has been used with some satisfaction where only an indication of a well's performance was needed prior to moving a workover rig. Connections to the stock tanks did not permit a separate test, so this method was used.

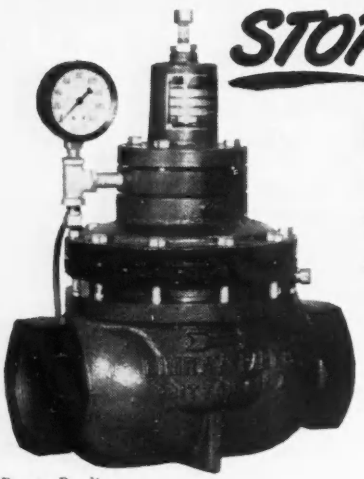
By using a 55-gallon chemical drum, a short test may be run on the well. This consists of parting the flow line and setting the drum under the lead line from the well.

The well should be pumped until the flow is stabilized and until any mixture of oil and water is fairly well leveled off. The union on the lead line is then parted, if possible, without shutting down the well. The line is raised to the top of the drum as shown, and the time noted when the fluid first begins to run into the drum. After the drum is within five gallons of being full, the time is again noted and the daily rate of production can be calculated.

After total fluid production per day is determined, the percent of water produced and percent of pipe line oil must be estimated. This means is illustrated in the photograph. A gauge glass tube usually used on boilers and pressure vessels is plunged into the fluid and the thumb held over the top end before it is raised. The water level will show up on the gauge glass and the height of the oil can be readily measured. The ratio of the height of the oil to the total depth of the liquid is the percent oil which can be converted into barrels per day by multiplying by the total calculated production.

BACK PRESSURE REGULATORS

STOP GAS LEAKAGE



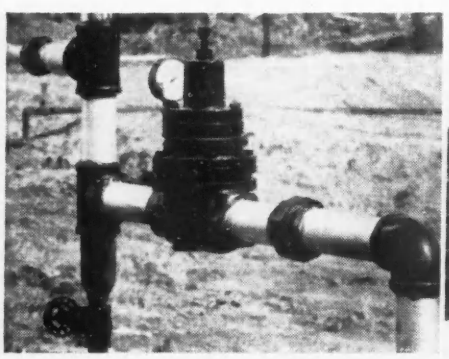
Patent Pending

FROM YOUR GAS VENT LINES

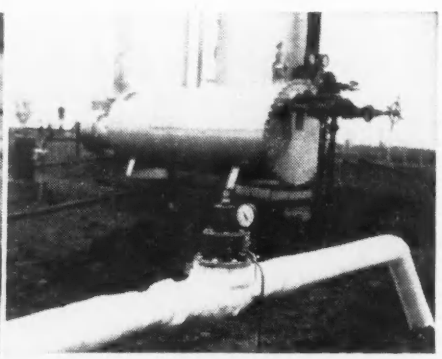
Kimray Regulators will pay dividends on gas savings. They shut off "bubble tight."

Constant pressure control unaffected by temperature changes. Full line opening—single seat non-bleed, built-in pilot.

Sizes available for immediate delivery: 2", 3", 4" screwed or flanged, 6" flanged. Contact your nearest distributor.



KIMRAY-PARKS BACK PRESSURE REGULATOR on treater vent saves gas to help fire burner.



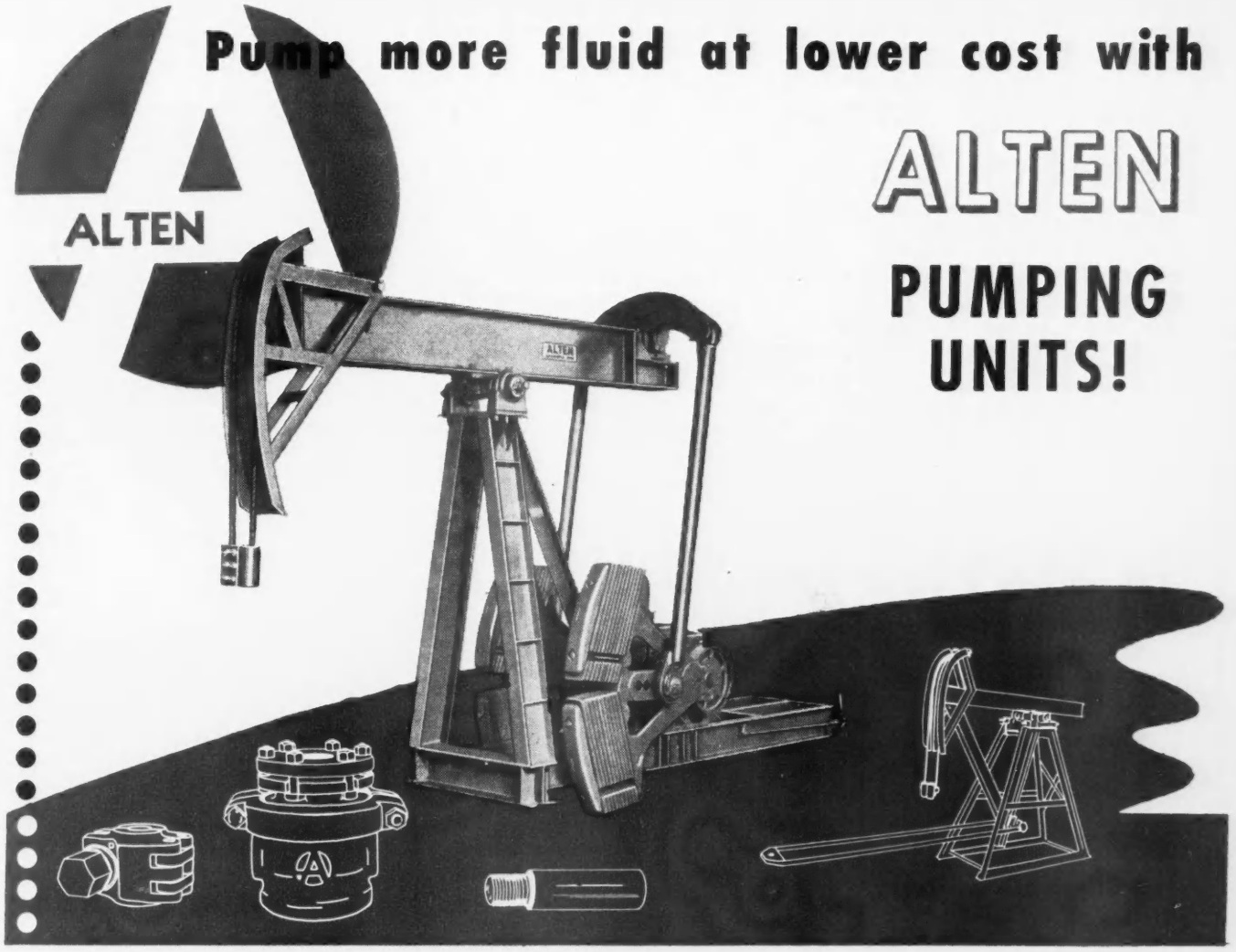
Ice-covered KIMRAY-PARKS REGULATOR holds constant pressure despite low temperature.

MANUFACTURED BY **KIMRAY INC.** OKLAHOMA CITY U. S. A.

Immediate Delivery Through:

HOUSTON, TEX.—Clif Mock Co.
CORPUS CHRISTI, TEX.—Engineering Service Co.
ODESSA, TEX.—Control Equipment, Inc.
GRAHAM, TEX.—A. L. Bethel
LOS ANGELES, CALIF.—Materials Service Co.
NEW IBERIA, LA.—Clif Mock Co., c/o Bill Ussury Tool Co.
DENVER, COLO.—Hinkson Oil & Gas Instrument Co.
CASPER, WYO.—Hinkson Oil & Gas Instrument Co.
OKLAHOMA CITY, OKLA.—Kimray, Inc.

Pump more fluid at lower cost with ALTEN PUMPING UNITS!



Before it is shipped, every Alten unit has to prove itself in tests that equal harsh operating conditions. You can be sure that every Alten pumper will perform to full rated capacity.

You get:

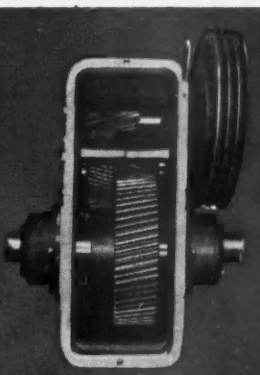
Longer Strokes
Higher Gear Reducer Ratings
Hardest Helical Gears

WHY ALTEN HELICAL GEARS ARE BETTER

Accurate Gear Teeth
Gear teeth mate perfectly because hobbing process cuts more accurately than shapers used to produce herringbone gears.

Reduced Shock Load
Impact or backlash loads are 10 to 20% lower than those on herringbone gears because Helix angles are 50% lower.

Flame Hardened Teeth Retain Perfect Profile
Because Helical gears have no unflexing centers, stress is evenly distributed over entire face thus retaining profiles of specially flame hardened gear teeth.



—ALTEN—
Foundry & Machine Works, Inc.
LANCASTER, OHIO

Buy Alten Oil Field Pumping Equipment at Your Local Supply Store.

Overflow Limits Water Level

An overflow manhole limits the level of water and/or oil inside a firewall near a residential area. It is at one end of a concrete ditch erected along one wall of the battery enclosure.

Purpose of the ditch is to collect any spillage or leaking oil so that it may be picked up and pumped back into storage. The overflow level is slightly below the level of the concrete sides of this ditch. The manhole

leads to a concrete sump that collects the overflow, which may be primarily oil floating on top of water below.

The sump can be emptied by the battery transfer pump, moving the oil back through the gun barrel tank and dumping the water into the disposal system.

Specializing
In SERVICE and SUPPLIES

- Long Sweep Ells
- Goosenecks
- Release Valves
- Slim Hole Swivels
- Suction Strainers
- Long Drill Collars
- High Pressure Fittings
- Slim Hole Rotary Tables
- Traveling Blocks and Hooks

Specializing in the design, perfection and manufacture of certain tools vital to the safety, economy and maximum results in drilling operations, BIG FOUR Machine and Supply Company is proud of its products.

We are equally appreciative of the confidence, friendship and cooperation of the oil industry and drilling contractors whom we have been privileged to serve.

When you need BIG FOUR drilling specialty items, see your favorite supply store—when your oil field equipment is run down, broken and in need of repairs, send them to a reliable, modern, well-equipped BIG FOUR shop.

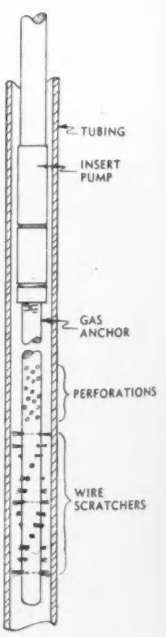
BIG FOUR MACHINE AND SUPPLY COMPANY

Main Office: 1013-14 Hales Bldg., Oklahoma City, Okla., Phone 79-1139
Box 256, Clay City, Illinois
Box 477, Pawhuska, Oklahoma

BEAVER TOOL & MACHINE CO., Maysville, Oklahoma
Complete Warehouse Stocks Available at:
C & W Machine Works Company, Great Bend, Kansas
Tillery and Parks, Odessa, Texas

Anchor Clears Way To Pass Insert Pump

Sometimes insert rod pumps pulled from a well producing a paraffin base oil will not pass through the tubing when running it back in, due to paraffin coating inside the tubing.

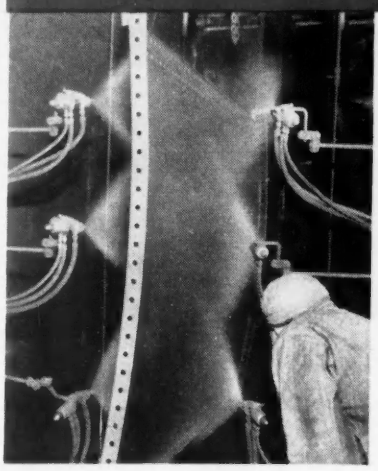


A gas anchor run on the bottom of the pump with stiff wire scratchers will help cut the paraffin when the pump is pulled and will usually let the pump back through the tubing.

Small holes are drilled two inches apart and staggered around the anchor along the lower part as shown. Stiff wire, such as that used on a measuring line, is cut to lengths about one-tenth of an inch less than the inside diameter of the tubing. Three or four of these short wires are inserted through the holes drilled in the gas anchor, protruding equal distances

Your Best Long-Term Buy Is Butler

BOLTED STEEL OIL TANKS • WALKWAYS AND STAIRWAYS



Each tank gets better, more uniform surface protection because of Butler electrostatic paint spray equipment. This 2-coat bond helps resist corrosion, adds longer life to the tank.

Butler Bolted Tanks . . . Walkways and Stairways . . . are your best long-term buy because the extra care and skill that Butler puts into engineering and fabrication give you extra years of service.

Each Butler tank sheet is die formed and all parts are precision made and punched for an oil-tight fit and easier erection. A.P.I. specifications on all tanks from 100 to 10,000 barrel capacities.

Remember that Butler is your best long-term buy. See your Butler Distributor.

You'll Always Get Dependable Service from Your Butler Distributor

Your Butler distributor will give you dependable service on Butler Bolted Steel Tanks, Walkways and Stairways, Unit Heaters and other oil field equipment.

AMERICAN PIPE & SUPPLY COMPANY

Casper, Wyoming — Denver, Colorado — Cut Bank, Montana

HARRY G. MILLER

El Dorado, Arkansas

UNION TANK & SUPPLY COMPANY

Fort Worth, Texas	Alice, Texas	Abilene, Texas	Great Bend, Kansas
Houston, Texas	Tyler, Texas	LaFayette, La.	Tulsa, Okla.
Odessa, Texas	Midland, Texas	Ruston, La.	Oklahoma City, Okla.
Snyder, Texas	Nocona, Texas	New Orleans, La.	Hobbs, New Mexico

W. H. CONNOR, INC.

Denver, Colorado — Sterling, Colorado — Casper, Wyoming — Powell, Wyoming

BUTLER STEEL PRODUCTS

BUTLER MANUFACTURING COMPANY

KANSAS CITY, MO.

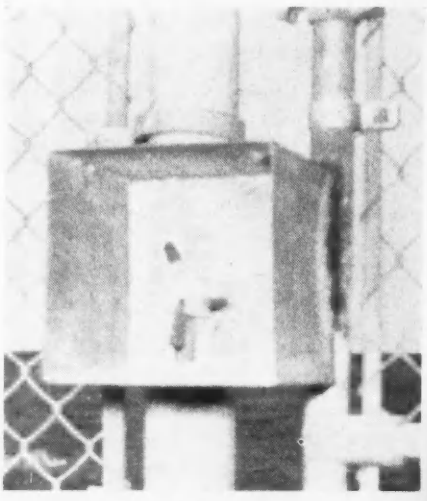
Galesburg, Ill. — Richmond, Calif. — Birmingham, Ala. — Minneapolis, Minn.

on both sides. The holes are peened to hold the scratchers firmly in place.

This inexpensive gas anchor will help eliminate the need for running a paraffin knife or circulating hot oil through the tubing before the insert pump is run. If the pump will not pass through, pull it up until free, then pump oil down the tubing to wash away the paraffin cuttings, thereby letting the pump pass through.

Box Makes Latch Foolproof

A simple galvanized rectangular container attached to the inside gate prevents unlocking from the outside yet can be operated from the inside of a fenced-in area. The case illustrated was designed to permit escape



from an enclosed area should high-pressure equipment catch fire or explode. Normally, all gates are locked and each attendant is given a key. However, if he were caught inside the fence it is doubtful that he could find a key, or, at least, the locked gate would delay his escape.

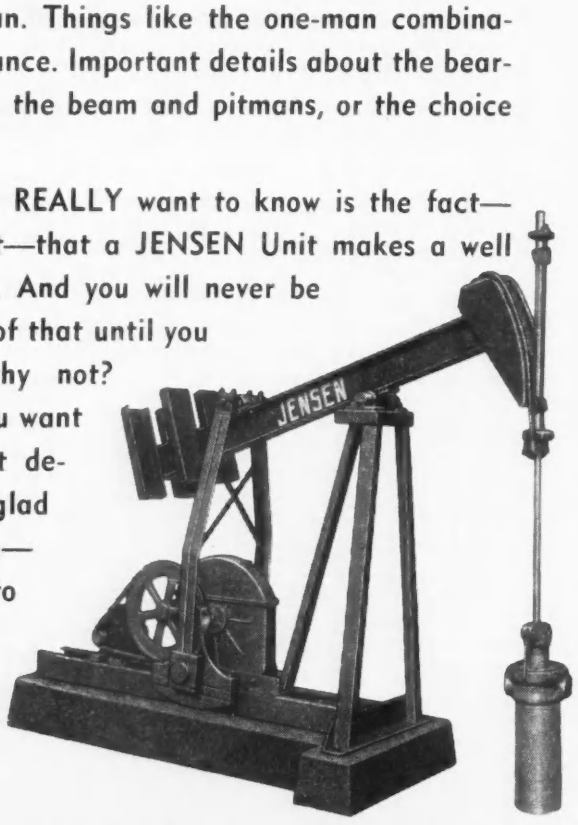
The latch on this metal gate is merely a piece of strap metal hinged to the gate so that it can only be raised up and down. When the gate is latched closed, the metal strap fits over a metal hook welded to the stationary fence post. To unlatch the gate, the metal strap has to be lifted from the hook. Ordinarily, this can be done from either side of the fence so long as the gate is not locked with a lock and key.

The space between the gate and fence post is not large enough to permit a person to place his arm between the two. Therefore, by welding this rectangular container to the gate and designing it so the latch can be closed in the normal manner, it is impossible to reach through from the outside and unlock the gate. The sheet metal container, measuring about eight inches square across the bottom and approximately ten inches long, is slotted to accommodate the metal hook on the fence post. The container is welded to the gate as shown and the latch hinged from the inside. In case of emergency, an operator can easily open the gate from the inside, but it cannot be opened from the outside, even though no lock is used.

The Important Thing About JENSEN UNITS

We could tell you things about JENSEN Pumping Units that would be mighty interesting to an engineer or technical man. Things like the one-man combination counterbalance. Important details about the bearings, the frame, the beam and pitmans, or the choice of power.

But what you REALLY want to know is the fact—and it is a fact—that a JENSEN Unit makes a well more profitable. And you will never be fully convinced of that until you try one. So why not? Meantime, if you want the nut-and-bolt details we will be glad to send a catalog—or you can turn to our section in the Composite Catalog.



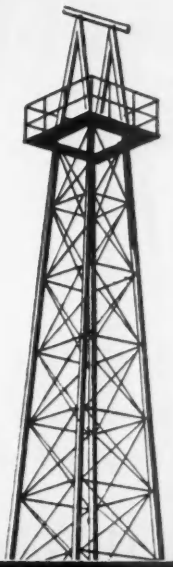
JENSEN

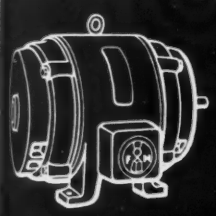
BROS. MFG. CO., INC., COFFEYVILLE, KAN.

EXPORT OFFICE: 50 CHURCH ST., NEW YORK CITY

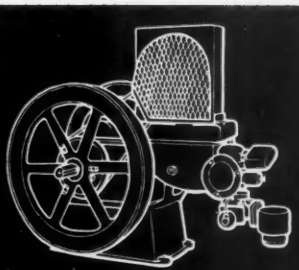
For More in Oil Field Equipment

it's FAIRBANKS-MORSE

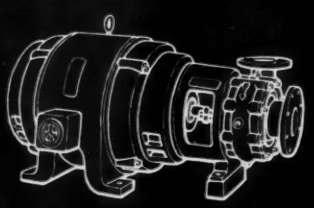




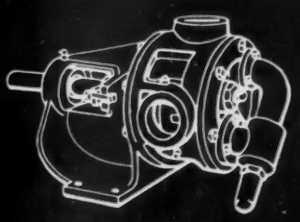
Electric Motors



ZC Engines



Builtogether Pumps

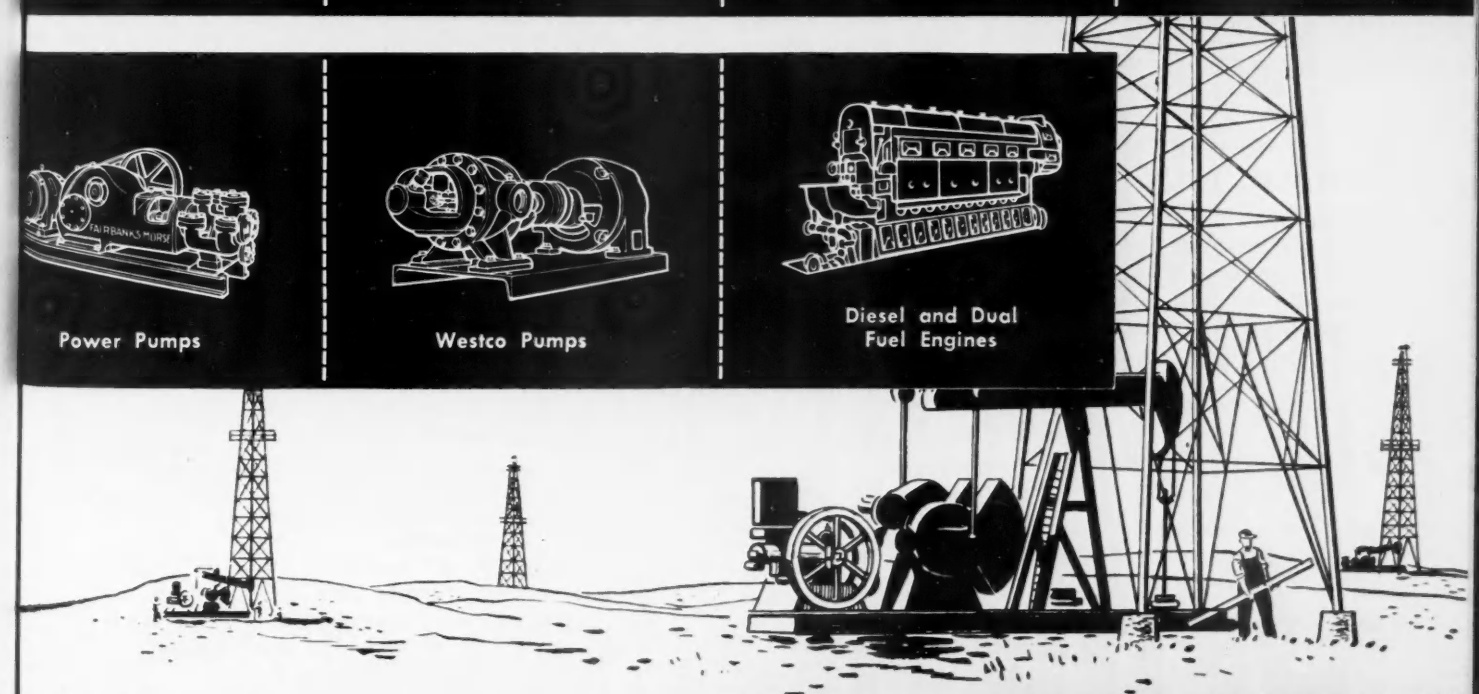


Rotary Pumps

Power Pumps

Westco Pumps

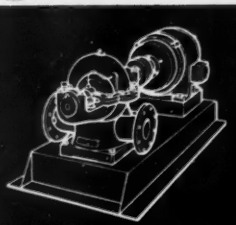
Diesel and Dual Fuel Engines



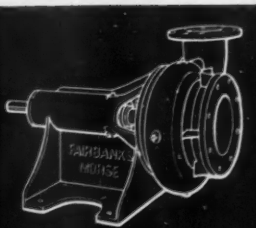
FAIRBANKS-MORSE,

a name worth remembering

OIL FIELD EQUIPMENT • PUMPS • SCALES • ELECTRIC MOTORS
LIGHT PLANTS • DIESEL, DUAL FUEL AND GASOLINE ENGINES
GENERATORS • MAGNETOS



Single and Two-Stage Centrifugal Pumps



Side-Suction Centrifugal Pumps

PUMPING PROBLEM

REDA

MAY HAVE THE *RIGHT* ANSWER

. . . from 1/3 HP to 240 HP . . . from 20 bbls to 17,000 bbls . . . from 200' to 10,000' and more . . . Yes, a REDA may do that pumping job BETTER . . .

Reda Pumps are accepted as original equipment, or replacement equipment, because they produce at a lower cost per barrel of fluid. Whether it's large volumes from shallow depths, or modest volumes from great depths, Reda Pumps provide operating savings.

IMPROVED DESIGN:

Constant research and design improvement are responsible for lengthened operating life; corrosion resistance, low labor cost per barrel of fluid produced.

IMPROVED EFFICIENCY:

Greatly improved overall efficiencies have improved Reda performance as much as 25%; a substantial operating saving.

If you have a pumping problem, our engineering staff is always ready to assist you. Phone or write:

REDA

PUMP COMPANY

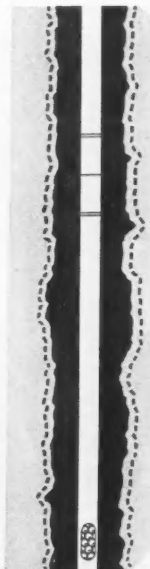
■

BARTLESVILLE, OKLAHOMA

Mast Saves Well Pulling Time

A permanent A-frame mast was set up over a pumping well that was particularly troublesome to save time in pulling the well with a light hoist. This well was in a river bottom and subject to periodic flooding. For this reason, it had to be mounted on an elevated platform made of I-beams and set in concrete. With all wellhead equipment below ground level, the polish rod stuffing box was raised by means of a short pup joint of tubing. Equipped with permanent metal stairways and walkways, the unit was capable of year-around operation, come rain and high water.

Since the well had to be pulled frequently, and this had to be done sometimes during high water, a permanent A-frame mast was placed over the well as shown. It was anchored on a concrete foundation and guyed at the top and at the middle. To pull the well during high water, a tractor-type hoist was all that was needed. It was floated to the location via a barge, and the pulling job handled as any similar land job would be performed. The placement of the mast on this location eliminated the problem of erecting a mast during high water, and it also served the same purpose for pulling jobs during the dry season.



Well bore cross section. Dotted lines indicate wall reaming.

Clean Out Congested Wells

WITH BURCH AGATE TORPEDOES

Marble blasting pays because marble abrasion is thousands of times greater than sand blasting. It frees oil and gas in the well bore by removing all retarding substances from the true pay formation.

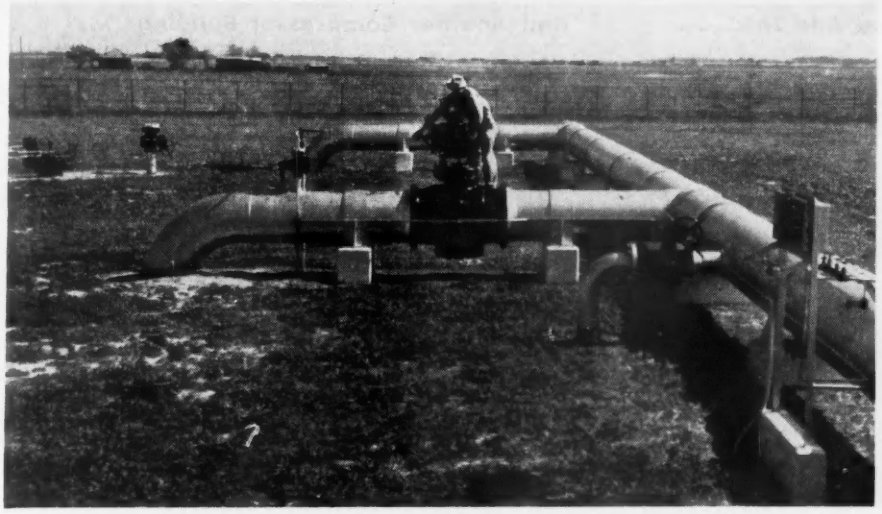
- CONDITIONS A WELL BORE OR SHOT HOLE BY RESTORING NATURAL FORMATION.
- ABRASION REAMING THE WALL CONTOUR DEEPER THAN RETARDMENT.
- EXPLOSIVE-DRIVEN GLASS MARBLES STRIKE THE WALLS WHOLE AND IN A UNIFORM PATTERN.
- 242 PER LINEAL FOOT OF HOLE.
- EACH MARBLE PENETRATES THE WALL SURFACE AND THEN BURSTS EXPLOSIVELY.
- DESIRED COLUMN TO COVER PAY IN ONE RUNNING CAN BE MADE WITH 5' SECTIONS.

Cross section view of torpedo

SIMPLE ● IMMEDIATE ● ECONOMICAL

BURCH *Agate Torpedo*

CALL YOUR OWN SHOOTER — **BORGER, TEXAS**



A 30-inch crossover manifold on suction side of TGT's East Bernard, Texas, station feeds suction pressure gas into two suction lines that run length of plant, tying into a similar manifold on discharge side of plant.

TGT Tie-in Piping Is Flexible and Safe

Problem of Tying Multi-Compressor-Building Stations To Four or More Parallel Pipe Lines Solved

A TIE-IN piping system which solves the problem of tying multi-compressor-building stations to four or more parallel pipe lines has been designed by Tennessee Gas Transmission Company engineers.

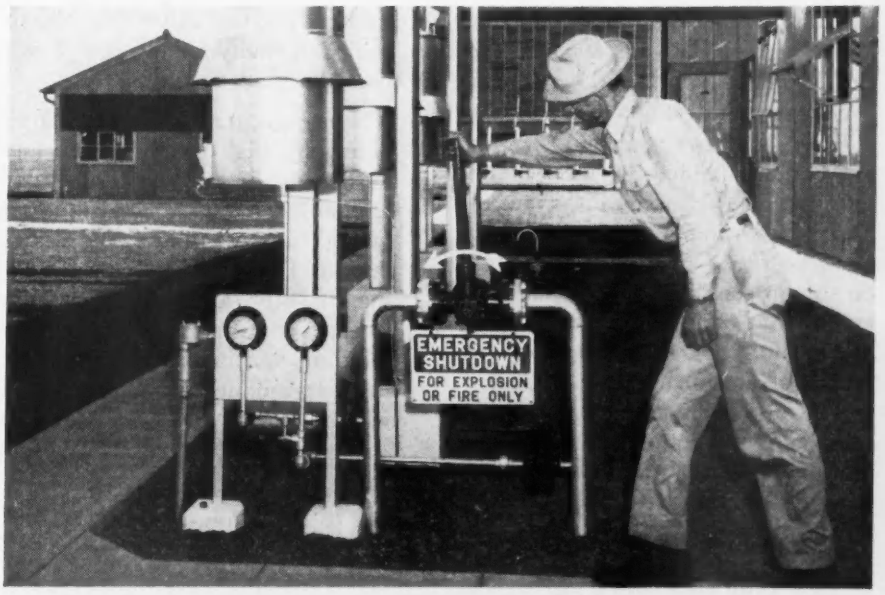
Several years ago, when Tennessee Gas engineers realized that the company's unprecedented expansion program would lead to four parallel pipe lines and possibly a number of four-compressor-building stations, they examined the tie-in system then in use.

The system was based on a single main line block valve for each pipe line with suction and discharge leads from each pipe line to each compressor building. The design was almost as old as the gas pipe line industry itself; and it provided a satisfactory tie-in system for a single pipe line and a single compressor building.

But when Tennessee Gas engineers projected the system to take care of four buildings and four pipe lines, they came up with an intricate piping arrangement (Figure 4).

The TGT engineers reasoned that any tie-in piping system, regardless of the number of compressor buildings and pipe lines, should fulfill these four basic requirements:

- The piping should be interconnected so each compressor engine or building can pump suction from any of the lines coming into the station.
- The design should include a simple, reliable system to shut down and to blow down the high-pressure gas in the station yard in case of emergency.
- The pipe and fittings should be structurally sound to stand up



If handle of this valve is pushed, things start happening at TGT's giant compressor stations. High-pressure gas enters shutdown system. Pressure-actuated mercoid shuts off ignition to compressor engines. Four eight-inch blowoff valves are opened in 5 to 10 seconds to vent the high-pressure gas. Main-line block valves close in 15 to 20 seconds and no more gas can enter station area.

If You Start With This . . .

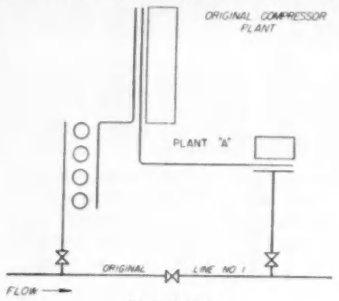


FIGURE 1.

And Add This . . .

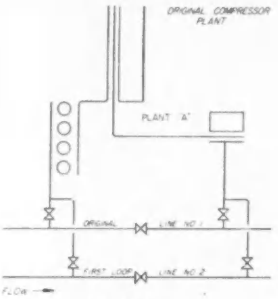


FIGURE 2.

And Another Compressor Building . . .

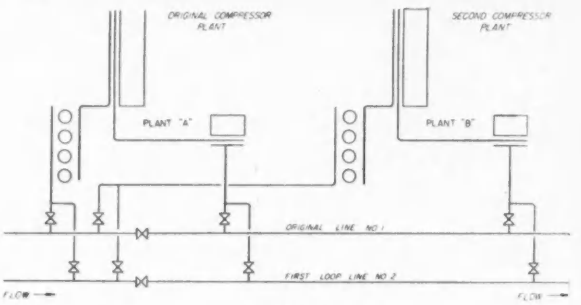


FIGURE 3.

You'll Eventually Get This . . .

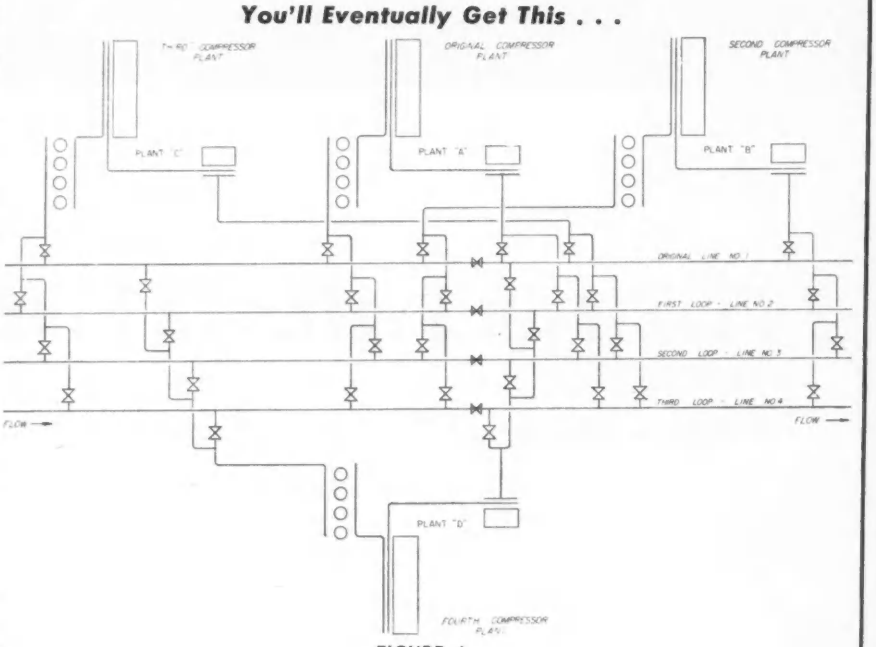


FIGURE 4.

under line pressures, mechanical loads caused by changing pressures and temperatures, and vibration or fatigue loadings.

- The piping system should be flexible enough to allow additional lines and compressors to be installed and tied in while existing facilities remained in service and without using hot-tap valves.

Existing Piping Practice

The simple piping arrangement where one compressor building ties to one pipe line (Figure 1) meets the four basic requirements. Yet difficulties will mount if the pattern is carried further.

For example, tying in the first loop line to an existing compressor plant (Figure 2) is a simple piping arrangement, yet it gives rise to these problems:

- The tie-over lines to the first loop must cross the original lines.
- The large diameter lines, if carried underground, would have to go deep and follow an awkward arrangement to make the necessary changes in elevation.

Figure 3 shows a second compressor building added to the previous installation. Additional disadvantages are that a suction or discharge line must be run a great distance to get on the proper side of the block valve, and hot-taps or shutdowns and blowdowns must be made to effect the piping arrangement.

Still, the troubles encountered to this point are not excessive. When only two pipe lines and two compressor buildings are involved, this tie-in system is feasible.

But if this pattern is projected to a station with four compressor buildings and four pipe lines crossing the yard major difficulties arise. As shown in Figure 5, the piping system is complex. Here are some of the difficulties involved:

- Many hot-tap valves must be installed or many facility shut-downs must be made.
- Numerous crossovers of large-diameter, high-pressure gas lines must be made involving a considerable number of pipe bends and the laying of some lines at excessive depths. Tie-in valves for one building must be located near to and sometimes among valves for another building, making it hard for operating personnel to tell which is which, with obvious disadvantages.
- Many valves must be installed near the plant facilities. In case of fire or explosion, it might be difficult or impossible to reach the valves to operate them.
- To isolate each compressor building from the pipe lines, requires operation of eight valves. Thus 32 valves must be operated to isolate a four-compressor-building plant, and in addition four main line block valves must be opened to bypass the plant. This number of valves would have to be operated as a routine procedure, as well as during an emergency.
- Because the future growth of a station can not be foreseen at the time of the original construction, there likely will be light-wall cross-country pipe immediately adjacent to plant facilities.

For these reasons, it is apparent that if this method of piping is used it becomes nearly an impossibility to fulfill the four basic design points described above.

Solution to the Problem

The new piping system developed by TGT engineers fulfills all four basic requirements. Design is simple.

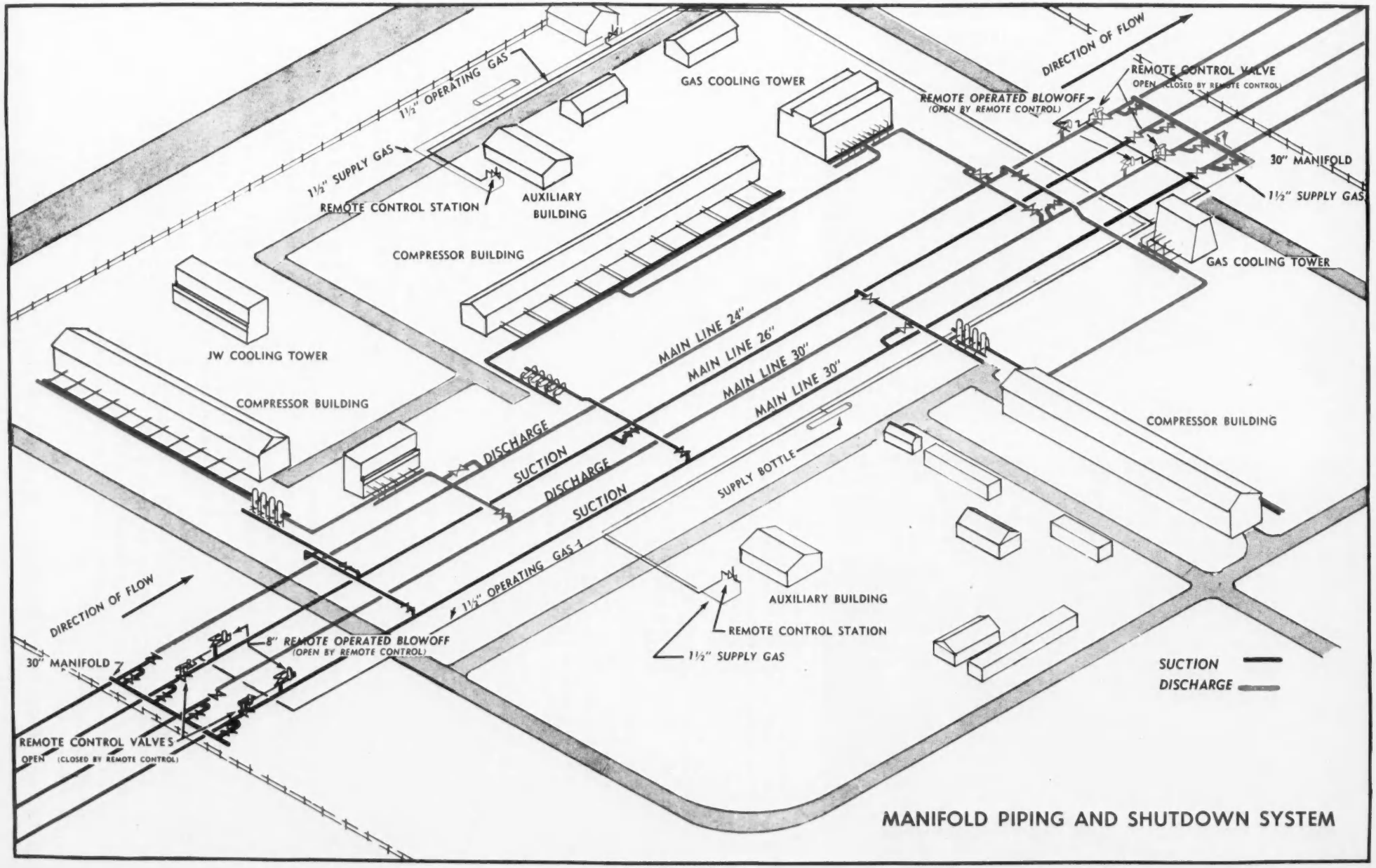
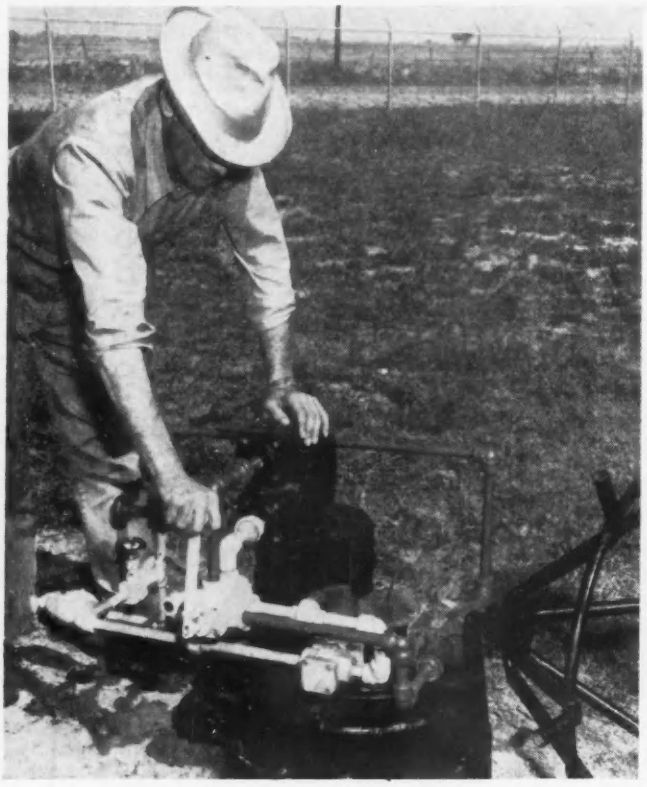
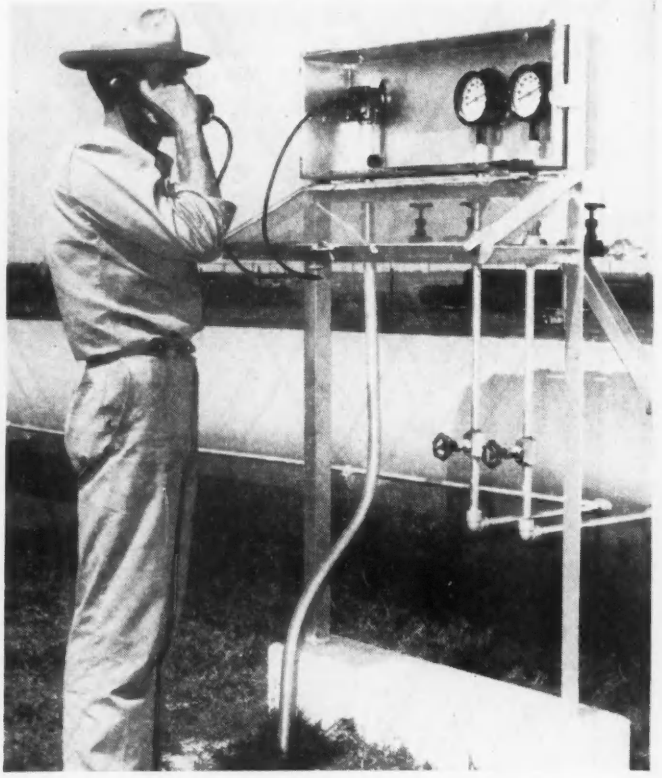

1½" OPERATING GAS
1½" SUPPLY GAS
REMOTE CONTROL STATION
AUXILIARY BUILDING
GAS COOLING TOWER
COMPRESSOR BUILDING
JW COOLING TOWER
COMPRESSOR BUILDING
DISCHARGE
SUCTION
DISCHARGE
SUCTION
MAIN LINE 24"
MAIN LINE 26"
MAIN LINE 30"
MAIN LINE 30"
1½" OPERATING GAS
DIRECTION OF FLOW
8" REMOTE OPERATED BLOWOFF
(OPEN BY REMOTE CONTROL)
30" MANIFOLD
REMOTE CONTROL VALVES
OPEN (CLOSED BY REMOTE CONTROL)
DIRECTION OF FLOW
REMOTE CONTROL VALVE
OPEN (CLOSED BY REMOTE CONTROL)
REMOTE OPERATED BLOWOFF
(OPEN BY REMOTE CONTROL)
30" MANIFOLD
1½" SUPPLY GAS
GAS COOLING TOWER
COMPRESSOR BUILDING
SUPPLY BOTTLE
AUXILIARY BUILDING
REMOTE CONTROL STATION
1½" SUPPLY GAS
SUCTION
DISCHARGE
MANIFOLD PIPING AND SHUTDOWN SYSTEM

FIGURE 5.





LEFT. A plant repairman shows how 30-inch remote-operated valve is serviced. After grease stick is applied the valve is partially closed and opened by selector valve. In case of shut-down, the automatic operator can close this valve in about 15 seconds.
RIGHT. A telephone at both suction and discharge manifolds can aid in locating blowouts. When a blowout is indicated, the various pipe line loops are isolated and pressure gauge readings will give a clue to the blowout. Telephone connects to station office, where 500 watt radio transmitter affords direct communication with field forces.

Four pipe lines cross the station site. Two are designated for station suction and two are for discharge. All of the compressor buildings take suction from the two suction lines, and pump into the two discharge lines.

Instead of one block valve per line there are two:—one for suction and one for discharge. They are at upstream and downstream limits of the stations, beyond future expansion. Beyond the block valves—upstream and downstream—there are 30-inch crossover manifolds, tying all transmission lines together. Manifold on the suction side of the plants channels all incoming gas into the two suction lines which run the length of the plant. The manifold on the discharge side of the station, distributes discharge gas from the two discharge lines that run through the station yard into all of the pipe lines.

Figure 5 shows how the system is made and operated. All of the valves on both 30-inch manifolds are open during normal operation. Of the four main line block valves on the suction side of the station, two are closed; two are opened. All suction gas must pass through the two open valves.

The two suction lines (black indicates suction) run the length of the station yard. They are blocked off near the discharge manifold (red). Two discharge lines, which run the length of the station yard, start at the closed main line block valves near the suction manifold. Discharge gas from compressor buildings feeds into the two lines. The gas then passes through the two open main line valves and is distributed to outgoing pipe lines by the 30-inch crossover manifold.

There are many advantages to this method of piping. For example, tying in an additional compressor plant requires no curtailment of services—either pipe line or existing compressor plants. Simply shut off one of the suction lines through the plant yard; let the existing compressor plants take suction from a single line and tie the new plant into the shutdown line. Then put the line back in service; shut down the other suction line; and repeat the process.

This same process is used to tie-in the two discharge lines. While these shutdowns are in progress there is an extra pressure drop at the station when one of the four lines which cross the station yard is out of service. This drop is negligible when balanced against the loss of blowing down a long section of pipe line for a station tie-in.

Another advantage of the new system is that scrubbers no longer need be located on the upstream side and the cooling tower on the downstream side of a single main line block valve. They can now be located anywhere between the block valves irrespective of the direction of main line flow, without complicating the plant piping pattern, and still permit a good tie-in connection. This flexibility permits much more latitude in the location, arrangement and interconnection of all the plant facilities, since the direction of the flow in the main line can be disregarded.

To bypass the plant, it is only necessary to open the four closed main line block valves. This makes each pipe line a thoroughfare line through the plant. The plant may be isolated from the main line and blown down if desired, by closing the suction and discharge valves for the individual compressor buildings.

It is unlikely that future TGT pipe line expansion will require more than four lines to be laid across the plant yard. Any fifth line loop would be tied into the suction and discharge manifolds only, and not continued across the plant yard. The manifold must be taken out of service to extend it for

they're custom-built to fit the job!

Work boats, pleasure craft

Drilling rigs, centrifugal pumps, generator sets

Earthmovers, logging yarders and loaders

Buses and highway trucks

Off-highway trucks, crawler tractors

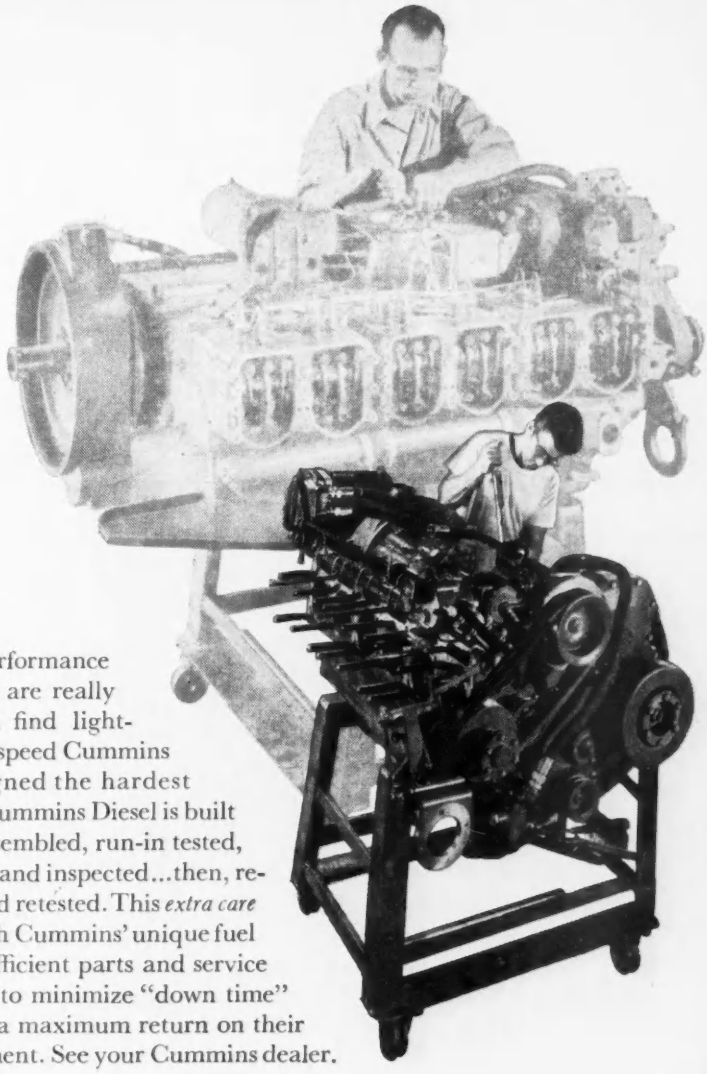
Shovels, cranes, industrial locomotives and switchers

Lightweight, high-speed Diesels (50-550 hp) for these and many other uses

Cummins® Diesels do so many jobs so much better

they're

BUILT NOT ONCE BUT TWICE



Wherever performance requirements are really rough, you'll find lightweight, high-speed Cummins Diesels assigned the hardest jobs. Every Cummins Diesel is built *TWICE*—assembled, run-in tested, disassembled and inspected...then, reassembled and retested. This *extra care* combines with Cummins' unique fuel system and efficient parts and service organization to minimize "down time" ...give users a maximum return on their diesel investment. See your Cummins dealer.

CUMMINS Dependable DIESEL

TRADEMARK REG. U.S. PAT. OFF.

Diesel power by CUMMINS

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

Export: Cummins Diesel Export Corporation • Columbus, Indiana, U.S.A. • Cable: Cumdiex

the tie-in, and while it is out of service, two pipe lines will be blocked off from the plant as far as the next main line valve installation where cross-overs are installed.

A simple and reliable remote control system to shut down the plant in an emergency has been made possible by this piping arrangement. Note in Figure 1 that all gas enters the plant through two main line block valves, likewise all gas leaves the plant through two main line block valves. Closing these four valves isolates the compressor plant from the pipe line. This means only four valve operators are required under this piping system as compared to a possible 32 operators in the previous system. Advantages are obvious. Even in the event one of the four operators fails, the operator-equipped valves can still be reached to be manually closed without danger to the personnel because these valves are located at the extreme limits of the plant site, usually a distance of 1500 to 2000 feet apart.

Each main line is equipped with an eight-inch blowoff valve which is operator equipped. These blowoff valves are connected to the control piping in parallel with the operator-equipped main line block valves. Thus these blowoff valves start opening as the main line valves begin closing, and the plant blowdown is started immediately upon activation of the control system.

Valve operators were custom made for Tennessee Gas. At the company's request two operator equipment manufacturers designed a new style valve operator. It has a 1000 pounds per square inch working pressure, high-speed, vane-type gas motor which, through a set of reduction gears, drives the hand wheel shaft of the valve. This drive is positive throughout with no declutching arrangements. Limit valves to shut off the gas supply when the valve has reached the closed position are a glove or slide type valve, spring loaded in the open position and closed by a cam which is mounted either on the main plug shaft of the valves or driven through a set of reduction gears from the valve hand wheel shaft. These limit valves are spring loaded in the open position so that they cannot be manually closed and left closed through oversight or neglect. A five-way manually operated valve is provided to reverse the direction of valve travel. This five-way valve is spring loaded in the emergency run position, i.e., to close the main line valve and to open the blowoff valve so that this valve cannot be left in the wrong position. The operators will close the main line block valves in from 10 to 15 seconds and will open the blowoff valves in about five seconds. The plant can be shut down and blown down in approximately two minutes.

Remote Control Piping System

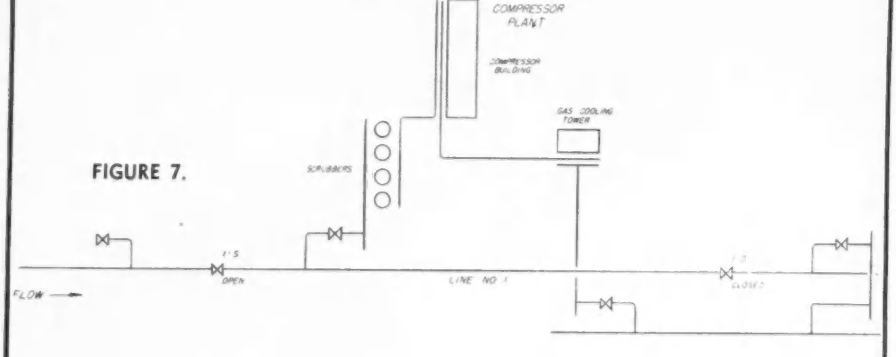
The remote control piping system is illustrated in Figure 5. Gas supply, shown in red, is obtained by a tap on the discharge manifold to use the highest pressure available, then is conducted through a 1½-inch supply line into storage bottles through a check valve. The check valve is to insure that a pipe line failure will not bleed off the gas reserve necessary to operate the remote control system. A line from the storage bottles then goes to a manually operated valve which is normally closed. This valve is the system's activating valve and is called the remote control valve. The system to this point always is pressurized. From this valve the gas is piped to the four main line valve operators and the four blowoff valve operators all of which are connected in parallel. Opening the remote control valve ad-

TGT Plans Piping Starting Like This . . .

FIGURE 6.

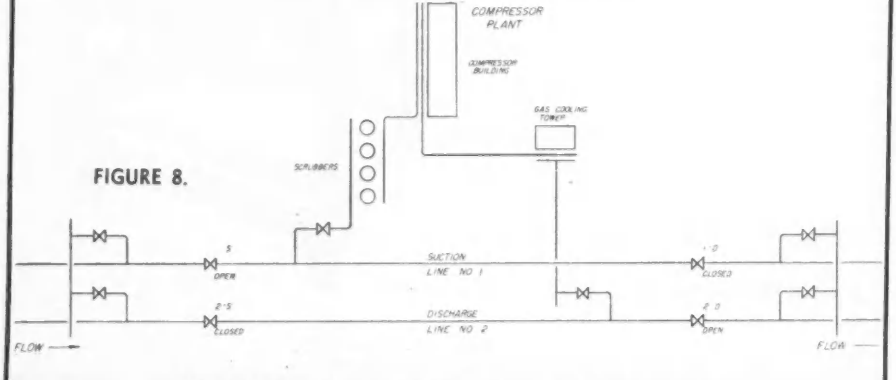
Add the First Compressor Building . . .

FIGURE 7.



And Another Pipe Line . . .

FIGURE 8.



(Figure 5 shows how new TGT manifold system works out.)

Strong-arm squad

on a submarine oil line!

You're looking at the longest and largest submarine oil line operation on the west coast. It's located near Ventura, California. Pacific Pipeline Construction Co., the contractor, is using four "Caterpillar" D7 Tractors and one D8 with Trackson Side Booms to handle the pipe.

Two cement-coated lines are being laid, each 4,200 feet long—a 20-inch line for loading tankers and an 8-inch line for unloading them. The 20-inch line weighs 185 lbs. per foot. Here you see the "Caterpillar" teams lifting a 250-foot section weighing 46,250 lbs. onto the trolley ramp which feeds the pipe into the sea. A "Cat" D8 Tractor with No. 8S Bulldozer prepared the approach from the ramp to the sea, and works on the dike that prevents high tides from flooding the launching platforms.

"Caterpillar" equipment has earned a reputation for taking all kinds of pipeline jobs in stride. It's built to stand up under a beating. However, you can get more work out of it by giving it good care. And that doesn't take long—just a few minutes' maintenance a day will pay off for you. So will keeping in touch with your nearby "Caterpillar" Dealer. He's got the know-how and facilities to be of real service!

CATERPILLAR, PEORIA, ILLINOIS

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES
TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

One of four remote-controlled blowoff valves at East Bernard compressor station.

mits gas to all operators at the same time and there are no other valves between the remote control valve and the operators which can be left closed accidentally or otherwise.

Additional Safety Features

Three additional safety features are incorporated in the remote control system to prevent an excessive pressure buildup on the discharge side of the engines in the event the blowoff on the discharge side of the plant fails to open as the discharge block valves are closed.

The first of these safety features is two eight-inch relief valves mounted on the main line discharge lines before the block valves. These relief valves provide sufficient capacity to relieve the pumping capacity ability on all the engines. The second safety feature consists of relief valves mounted on the discharge side of each individual compressor engine. The third safety feature consists of a shutdown system to shut off the compressor engine ignition which is fed from the main plant switchboard through rectifiers. This system is activated in this manner: A mercoid switch is mounted on the remote control piping system on the outlet side of the remote control valve. The same gas pressure which operates the main line valves and blowoff valves will close the mercoid switch. An electric circuit fed from the 440 volt three-phase main plant bus is completed through the mercoid switch and energizes trip coils installed in the main switchboard circuit breakers which supply the compressor engine ignition system. As these circuit breakers are tripped, all of the compressor engines in the plant are shut down.

Additional safety precautions to help prevent the possibility of fire in the event of escaping gas in or near the compressor building consists of additional trip coils mounted on the circuit breakers which supply all of the light and power to the compressor building. Thus all electrical wiring in the compressor building is de-energized when the remote control system is activated. These circuit breakers are all equipped with dead-man type bypass switches so that the performance of these breakers may be periodically checked without shutting down the plant. Since these switches are spring loaded in the off position, they cannot be left in a position to bypass the breakers and make the safety precaution inoperable.

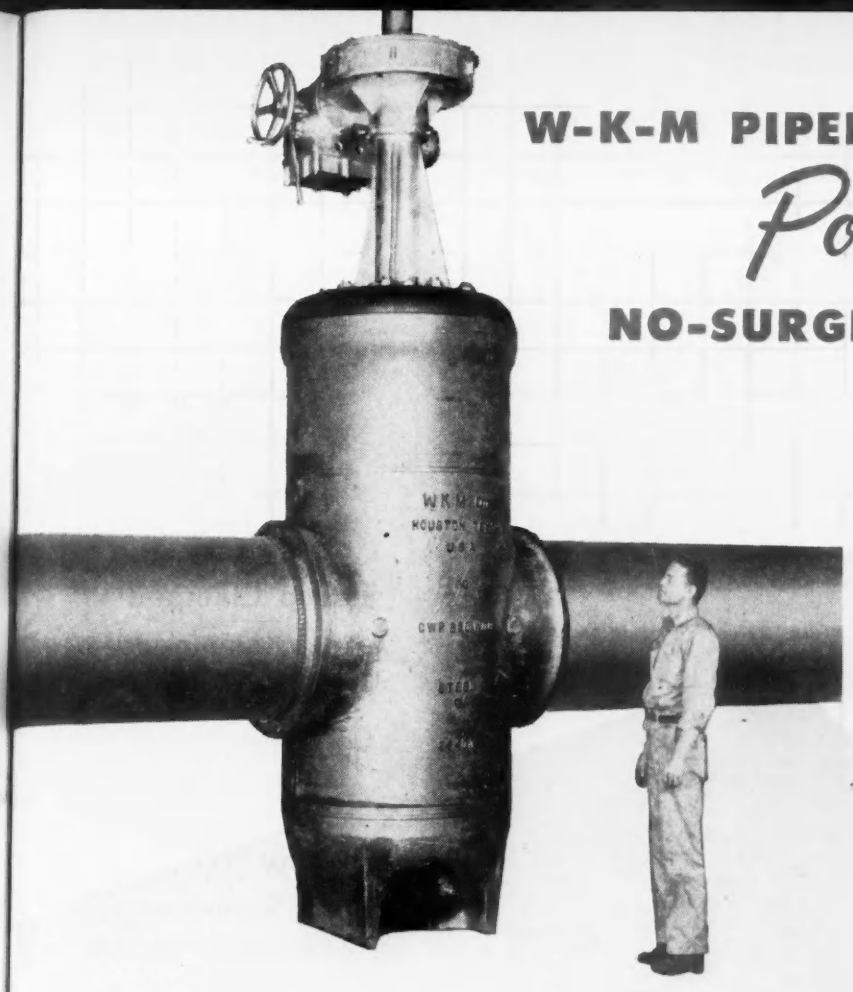
In a multiple pipe line system it is difficult to determine which line has failed at the compressor station since the lines are all equalized at the plant. TGT normally operates its system with the crossover lines closed at its main line valve settings. Therefore, pressure is equalized only at the compressor station. Gauges are mounted on each pipe line on the pipe line side of the suction and discharge manifolds. In the event of an emergency or pipe line failure on the main line, each line can be successively closed off from the plant and manifold, and by watching the action of the pressures shown on the gauges, the leaking line can be quickly isolated from the system. Other lines and the plant can remain in service.

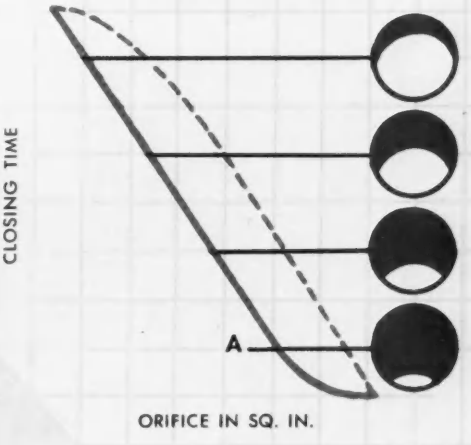
There are sound-powered telephones at each manifold. Personnel operating the valves at the manifold are in direct communication with the station operator in the office, who in turn, by means of a short-wave two-way radio and lease line telephone facilities is in touch with the central office dispatcher and also field crews which will be directed to the scene of the pipe line break.

Stronger Materials Installed

Where materials were obtained, in repiping compressor stations to the system outlined, all pipe fittings, valves, etc., subject to high pressure gas were installed to conform to the ASA B31.1 Code for Pressure Piping, to Division 1 standards of Section 2 of the code, or better. For plants operating at 760 psi discharge all large-diameter high-gas-pressure gas pipe in the plant yard either was installed or relaid to the following wall thicknesses and diameters: ½-inch wall thickness x 24 inches; ⅝-inch wall thickness x 26 inches; and ⅞-inch wall thickness by 30 inches. Since the production pipe mills do not normally make pipe in wall thickness greater than one-half inch in these sizes, it was necessary for a considerable portion of the pipe to be manufactured by fabricators. This pipe being non-expanded, was all stress-relieved and hydraulically tested. A new line of fittings was designed and manufactured to make the required connections possible. All the materials in both the pipe and fittings were at least 42,000 psi minimum yield material and all wall thicknesses were specified as minimum instead of nominal to obtain full strength throughout all fittings and pipe.

W-K-M PIPELINE VALVES GIVE *Positive* NO-SURGE OPERATION





Dotted line shows closing curve of conventional gate valve.

W-K-M Pipeline Valves may be closed as fast as required without setting up dangerous line surges.

There is no need to "baby" W-K-M Valves with partial hand operation or two-speed motor operators because they may be closed at a ***rapid constant speed, yet give the necessary gradual close off at the critical point to prevent surging.***

The curve above illustrates. From full-open to point A the rate of closing is almost straight-line. From point A (about 70% closed) the rate of closing slows up and approaches the fully closed position very slowly. In W-K-M Through Conduit Valves, the basic design of the gate and conduit provides just the right variable ratio of port area to gate travel to prevent surging, while the valve is operated at constant speed.

Specify W-K-M for surge-free closing as well as the many other advantages which have been proved and tested on the world's leading pipelines.

W-K-M Pipeline Valves have Through Conduit Design, Leverlock Operation, Parallel Expanding Gates, Pressure Seal Bonnets, Replaceable Seats.

W-K-M Valves are made in sizes from 2" to 30", in series 300-400-600-900-1500.

W-K-M COMPANY

P. O. BOX 2117 HOUSTON 1, TEXAS

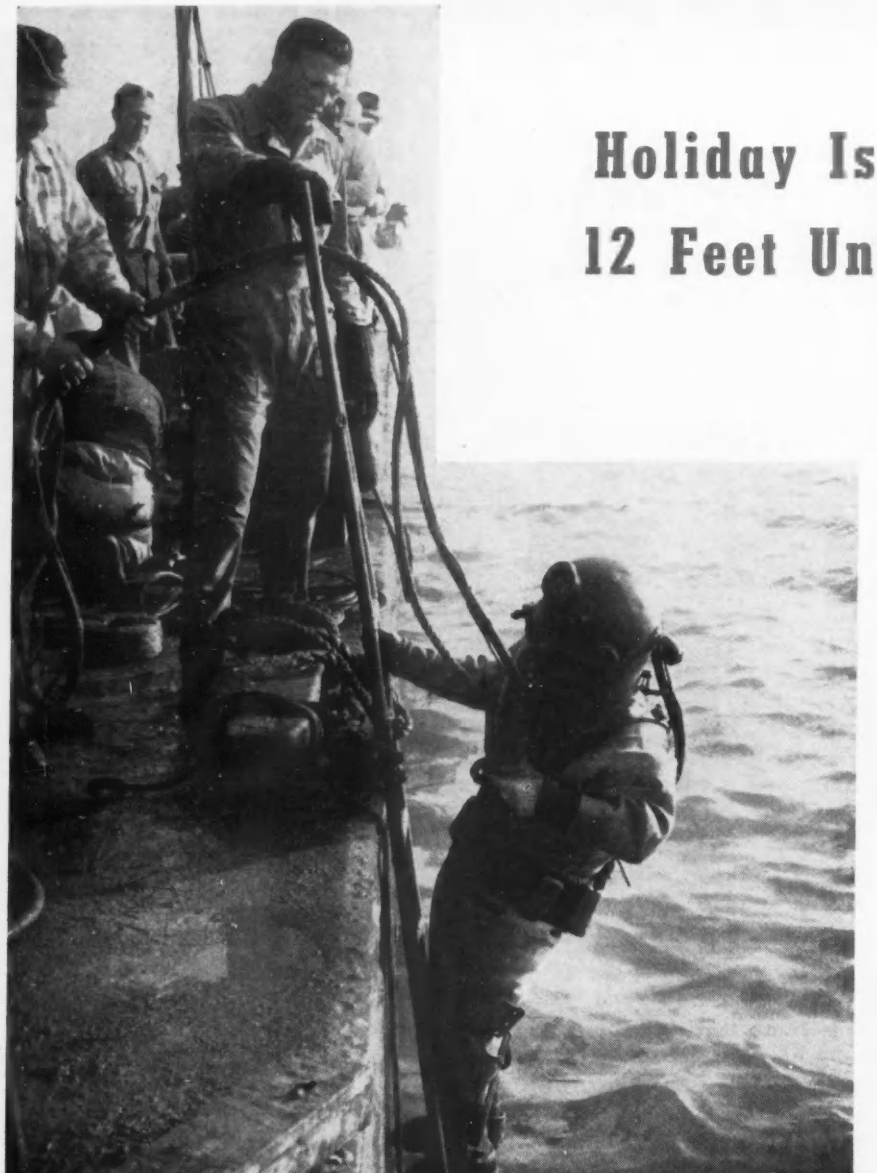
727 W. SEVENTH ST., LOS ANGELES, CALIF.

EXPORT OFFICE: 30 Rockefeller Plaza, New York, N. Y.

W-K-M *Valves*

MOST OF THE WORLD'S NEWEST PIPELINES ARE TIED TOGETHER WITH W-K-M VALVES

Holiday Is Repaired 12 Feet Under Water



Sleeve Clamped Around Damaged Mastic Coating, Concrete Jacket

By O. W. FOWLER
Division Superintendent
Pan American Gas Company

A 12-INCH wide and 30-inch long holiday in the coating of Pan American Gas Company's 18-inch Galveston Bay pipe line crossing was repaired under 12 feet of water in just a few hours time. The job was done by clamping a watertight sleeve over the pipe at the point of the break and displacing the water inside the sleeve with a stream of heated air. This air dried the pipe and sleeve after which it was filled with molten asphalt.

The ten-mile long Galveston Bay crossing, a key link in Pan American's system which carries natural gas from Chambers County, Texas, to industries of Texas City, was completed early this year.

Half-inch wall, mastic-coated, concrete-jacketed pipe was laid from both sides of Galveston Bay to the Houston Ship Channel, leaving a 1700-foot gap across the channel. After the

LEFT. Bottom section of sleeve made from 26-inch pipe. Longitudinal flange is covered with soft rubber gasket.

RIGHT. The assembled sleeve. Soft rubber gasket seals ends against concrete jacket on pipe.

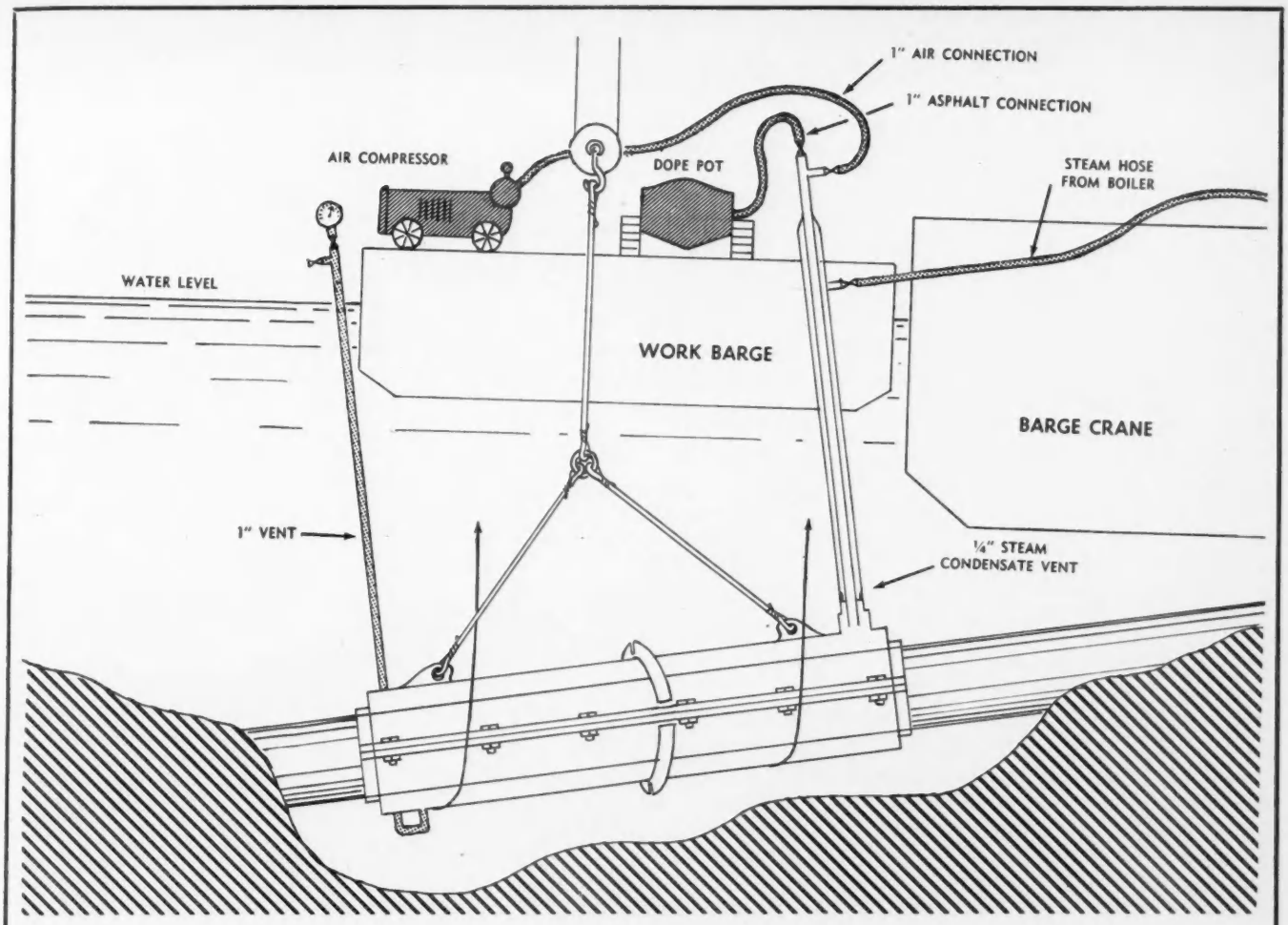


FIGURE 1. How the underwater holiday repair was accomplished.

approaches and the 10-to-12-foot ditch beneath the channel were dredged, the 1700 foot section of line was pulled and tied in.[1]

Several days after this ship channel crossing was pulled into place and completed except for backfill, a diver inspected the section and found the pipe resting on the bottom in the ditch and already partially backfilled by tides and waves. However, at a point 20 feet inside the southwest approach, where the line slopes downward to cross beneath the 40-foot-deep ship channel, he found the coating severely damaged, exposing bare pipe. The damaged area extended diagonally across the top of the pipe. Both the concrete and mastic were torn off but the pipe itself was undamaged. Shape of the break in the reinforced concrete jacket indicated a barge or ship had rammed the pipe prior to placing this section in the ditch.

Had this damage occurred in an area where the pipe was virtually horizontal, it would have been a relatively simple matter to raise the pipe out of the shallow water and repair it. But since it occurred on the slope leading to the bottom of the 52-foot ship channel cut, it was inadvisable to attempt an above-water repair and risk undue stresses and perhaps permanent bends in this vital crossing area. So underwater repairs were required. This holiday would have been offset by cathodic protection, but since its exact location was known and in view of its proximity to the ship channel, it was decided to attempt repairs.

Preparations for Repairs

The actual job of repairing the holiday was completed in six or eight hours, but preparations for the job took several days.

Since the outside diameter of the pipe was approximately 21¾ inches, 26-inch pipe was chosen to make the sleeves. An eight foot length of pipe was cut in semicircular halves to form the basic parts of the two-piece sleeve. The longitudinal edges were trimmed to leave room for the ½-inch by 1½-inch flange and gasket which ran the length of both sides of the sleeve. Circular sections of 1½-inch channel iron formed the ends of the sleeve. A one-inch by ¾-inch heavy, soft rubber gasket was nested and cemented inside the channel iron and also along the longitudinal flanges.

A three-inch coupling was welded into one end of the upper half section of the sleeve (Figure 1). A 14-foot three-inch pipe was made up into this coupling. Encased inside the three-inch pipe and welded to it at each end was a one-inch combination air and asphalt line. The three-inch pipe served as a steam jacket for the one-inch line. Two quarter-inch vent holes in the base of the three-inch allowed steam condensate to bleed into the bay as it formed. A collar welded in the bottom of the lower section of the sleeve served as a connection for a vent piped to a pressure indicator and a valve at the surface which could be used to maintain desired back pressure on the sleeve.

Repair of the Line

Once the sleeve was completed, the repairs began. A stiff-leg barge crane and a small work barge were towed

to the site. On the barge crane was equipment for two divers, welding machine and miscellaneous equipment. On the work barge there was an air compressor, a dope pot, and a small two-inch bell hole pump.

The first step was to uncover the line and excavate two feet beneath it. The two-inch pump provided an inexpensive but efficient means of doing this. The two-inch hose from the pump was tied to a half-inch nozzle and in 30 minutes the divers jetted out the salt sand and clay necessary to provide clearance for the sleeve.

The barge crane lowered the two sleeve sections into place, with the divers guiding them around the pipe and bolting them together. The first time air pressure was turned into the sleeves several leaks were apparent and the longitudinal gasket between the flanges blew out in several places. When the diver inspected the sleeve he found that the blowouts were at the splices in the longitudinal gaskets.

The top half of the sleeve was unbolted and hoisted to the surface where repairs were made. The gaskets were recemented and lips of metal were welded behind or outside the spliced sections to prevent further blowouts.

The sleeve was once again lowered beneath the surface of Galveston Bay and bolted around the pipe in the water. When air pressure was applied several small leaks developed where the gaskets were joined. The remedial step was to pinch down on the exhaust valve to maintain a back pressure of six pounds per square inch on the sleeve. This pressure was sufficient to overcome the hydrostatic head and to keep water from leaking into the sleeve.

Once the water had been replaced by air inside the sleeve, steam was circulated into the three-inch steam jacket and out the weep holes in the base to heat the air being pumped into the sleeve. The heated air was maintained for two hours to dry the pipe and coating inside the sleeve. Then asphalt was pumped into the sleeve.

The asphalt was heated to 300° F. and pumped by a conventional pipe line dope pot. A high-pressure, steel-jacketed hose ran from the pot to the connection to the sleeve. While the asphalt was being pumped into the sleeve, the air connection was left partly open, maintaining a back pressure of about six psi on the sleeve to prevent water from entering it.

As the asphalt filled the sleeve it plugged small gasket leaks. When asphalt returns appeared in the one-inch vent line, the vent valve was closed and the pump continued to force asphalt into the sleeve until the pressure was finally built up to 35 psi. Calculated volume of the sleeve was about 70 gallons. Actually 100 gallons of asphalt was pumped into the sleeve, indicating a leakage of 30 gallons.

Once the asphalt had solidified inside the sleeve, the three-inch and one-inch lines were removed, and the sleeve left in place and the line was ready for backfill.

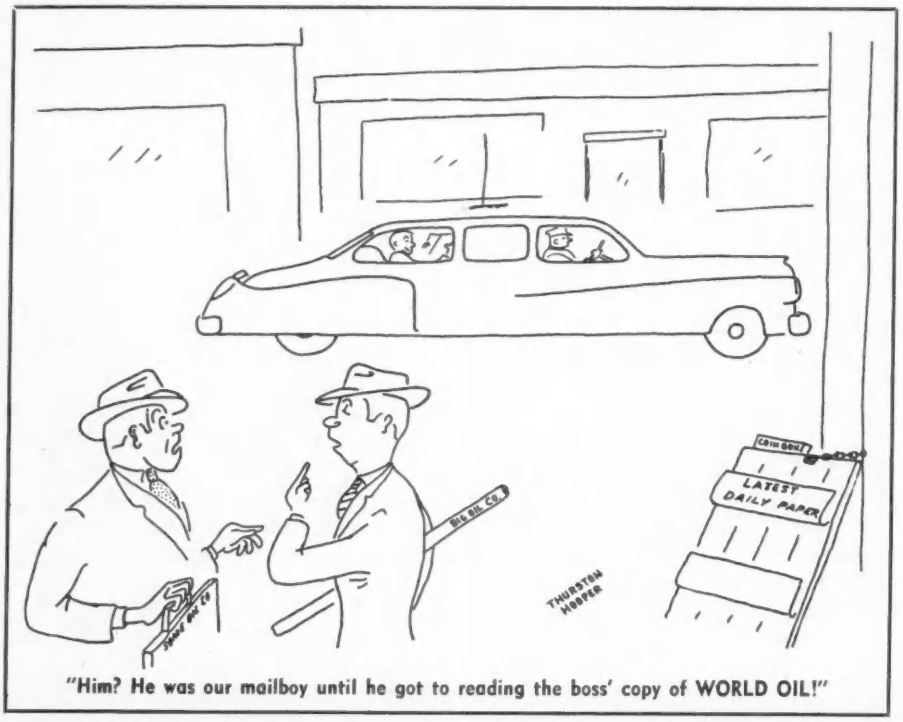
After the break in the coating had been discovered, it was decided to try a holiday detector to ascertain its usefulness in finding coating breaks on lines laid in salt water.

The holiday detector tested was the conventional type used to find breaks in the coating of underground pipe lines. The transmitter was connected to the pipe line on shore and a boat carrying the receiver was used to "walk" the line. Two leads spaced approximately ten feet apart were lowered into the water and connected into the receiver. A steady, strong, clear signal was continuously received as long as the boat remained within 20 feet of the line. As the receiver approached the known break, the signal increased in intensity, being the strongest directly over the holiday, and then diminishing to normal signal strength 2000 feet beyond.

Later when this break had been repaired and tested, the detector again was run with no increase in signal strength in this area, indicating that successful repairs had been made. It is interesting to note that the holiday detector served the secondary function of a pipe line locator very successfully. The results indicated by the closing run over the full length of the line, were verified by current requirement tests which indicated a phenomenal low current requirement of 0.3 amperes at 0.90 volts for this entire ten miles of 18-inch pipe, indicating that the coating is 99.94 percent effective.

About the Author

O. W. FOWLER has been with Pan Am since 1941. He joined Pan American Production Company and after two years transferred to Pan American Gas Company. He was graduated from Oklahoma University in 1940. Shortly after graduation he went to work for Sawyer Drilling Company as petroleum engineer.



"Him? He was our mailboy until he got to reading the boss' copy of WORLD OIL!"

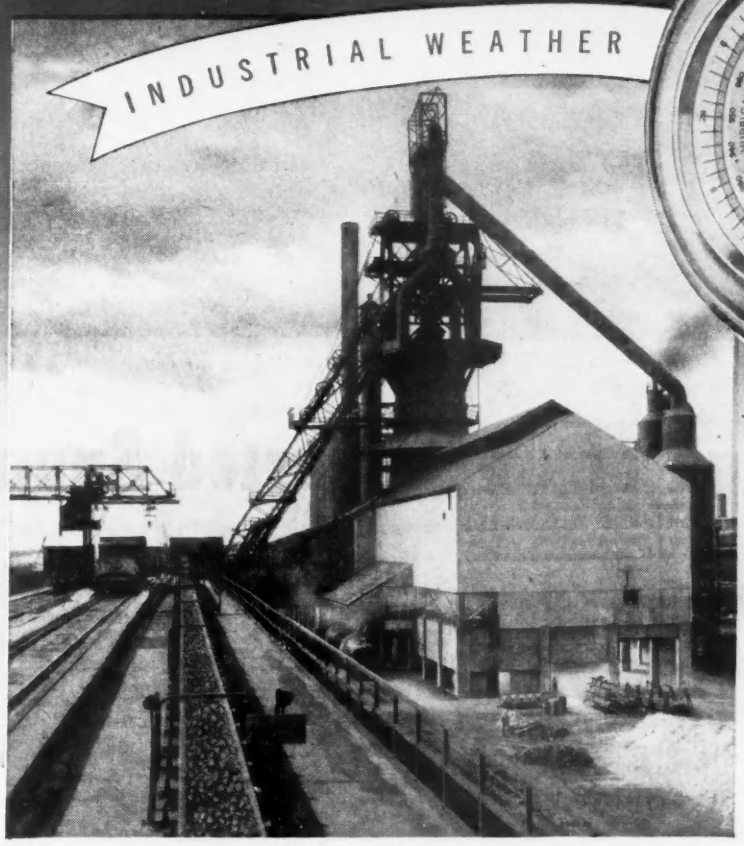
REFERENCE

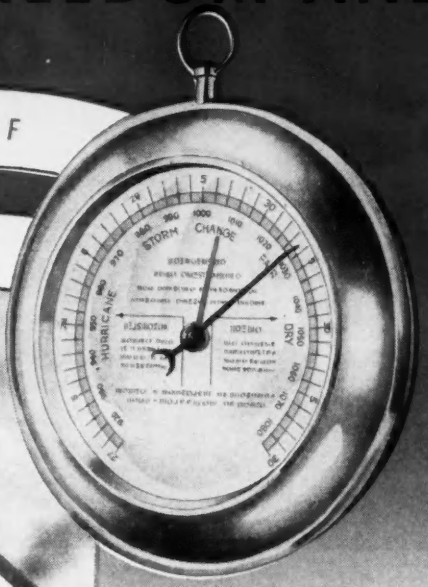
[1] World Oil, Feb. 1, 1952.

Steel

BULWARK OF FREEDOM AND...

BAROMETER OF INDUSTRIAL WEATHER





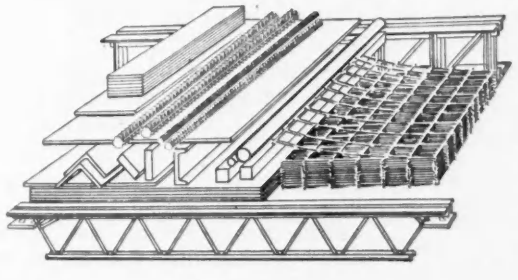
Sheffield Blast Furnace—First to utilize Texas iron ore and coke from Oklahoma coal in a fully integrated at-home steel making operation.

Look at the activity of steel making and you look at a dependable business forecast.

West of the Mississippi and East of the Rockies, good business weather has long been reflected in the ever expanding facilities and activities of Sheffield Steel.

Within the last ten years, Sheffield's at-home steel making capacity has more than doubled. Sheffield Steel has expanded into a fully integrated at-home steel making operation from mining the raw materials to mill finished and fabricated steel products.

Look at the Sheffield customer list and you see the names of the leaders in manufacturing, agriculture, transportation, construction, oil, etc. With them, Sheffield Steel is proud to march in step with the greatly accelerated growth of what very aptly has been termed—the inner stockade of the garrison for freedom.



Sheffield Steel Shapes Up Many Ways For Production and Construction

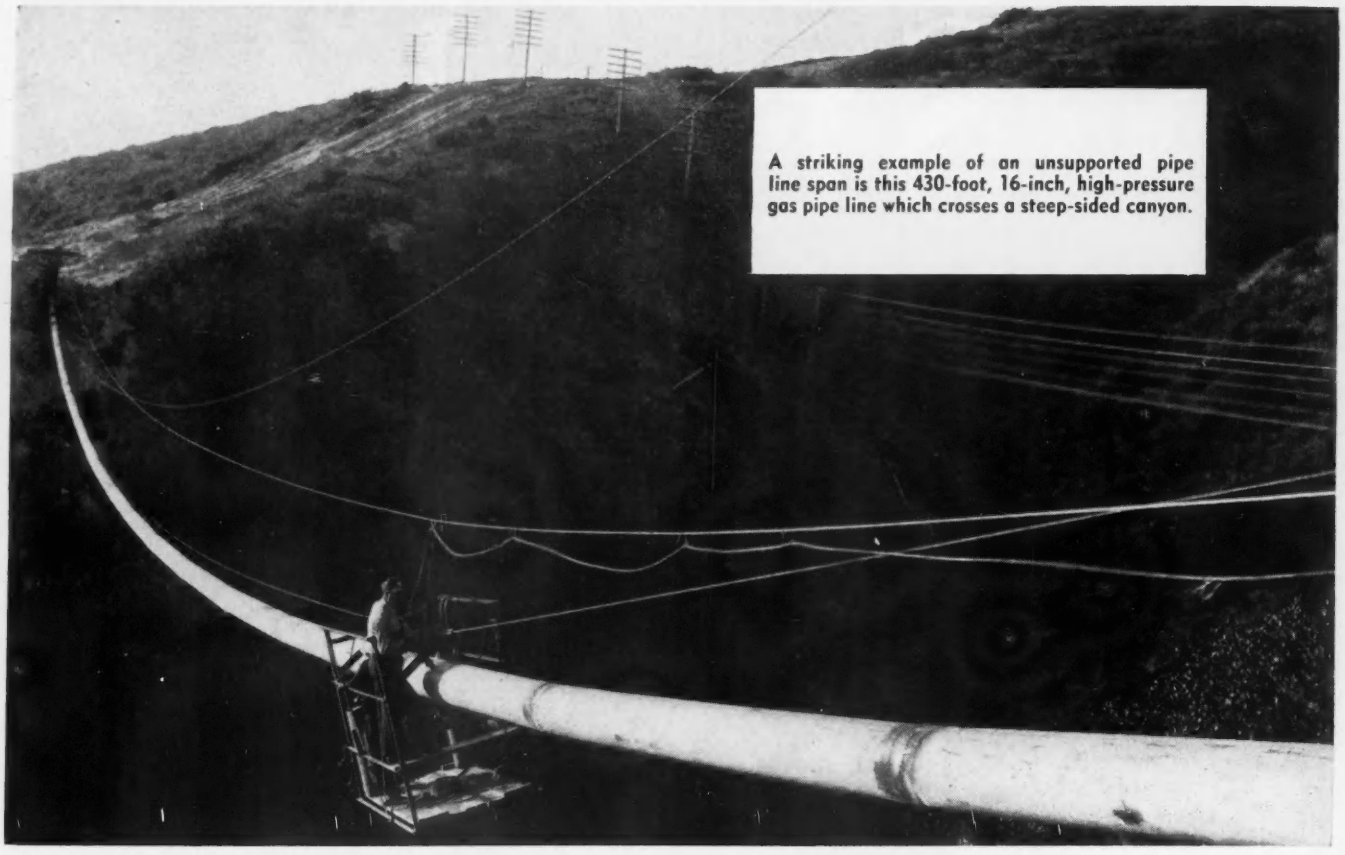
For manufacturers there is merchant steel—plates, sheets, and bars of all shapes, bolt products, nails, tacks, spring wire and other wire products. For the construction industry there are special products — crescent bars and welded wire mesh for reinforcing concrete, structurals and long and short span open web joists.

SHEFFIELD STEEL CORPORATION
HOUSTON KANSAS CITY TULSA
SUBSIDIARY OF ARMCO STEEL CORPORATION

IRON AND STEEL SCRAP MEANS .....

MORE STEEL FOR AMERICA
More Money In Your Pocket!

GET YOURS OFF TO THE DEFENSE LINES NOW!



A striking example of an unsupported pipe line span is this 430-foot, 16-inch, high-pressure gas pipe line which crosses a steep-sided canyon.

Analysis and Design of Unsupported Spans

Open Pipe Lines High Above the Level of Flash Floods Save Money in Construction and Future Maintenance

By PHILIP E. REYNOLDS
Pacific Gas and Electric Company

EARLY in the planning of Pacific Gas and Electric Company's 34-inch Topock-Milpitas natural gas line it became apparent that using open pipe spans to cross the many gullies, creeks and canyons would save money in construction and future maintenance.

The open spans cross high above the level of the flash floods that sometimes turn bone dry gullies into rampaging rivers that can scour out underground pipe line crossings. The spans are inexpensive and—if properly designed—as efficient as other type crossings.

Design of the spans starts with design of the pipe. The trend in large diameter pipe line construction has been toward the use of higher strength steels, following codes accepted by the industry. Most widely adopted code for design of cross country gas transmission lines has been the American Standard Code for Pressure Piping (ASA B31.1-1951). Section 2 of this code prescribes design standards for gas piping, while Division 2 of Section 2 applies to transmission lines passing through sparsely populated rural areas, and lists maximum allowable values of stresses and gas working pressure. This part of the code governs design of the open pipe spans.

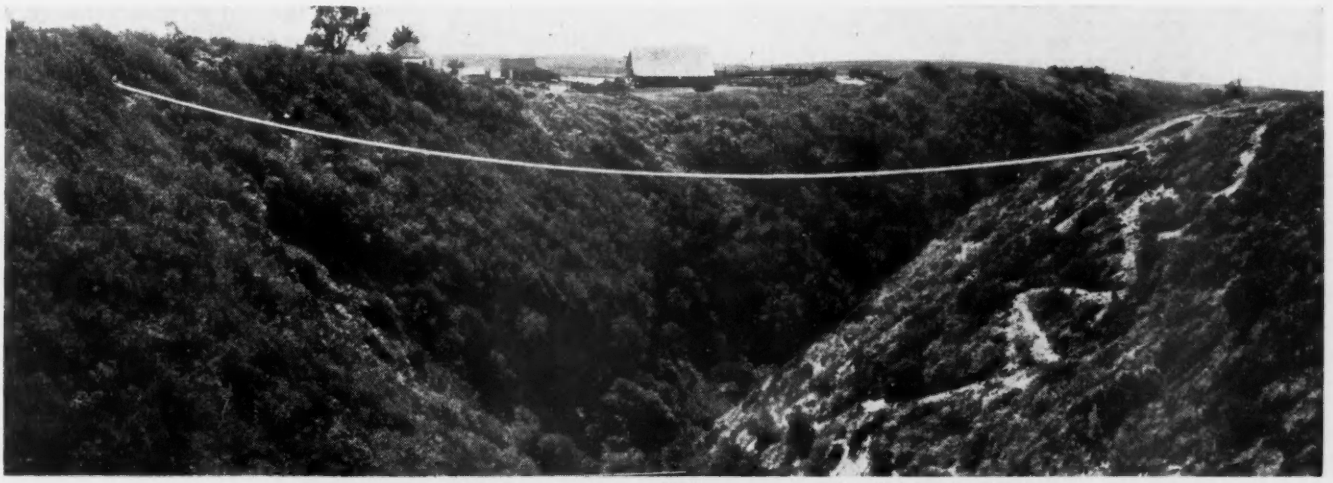
The pipe which was installed on the Topock-Milpitas line is an electric fusion welded product, fabricated from steel made by open hearth process. The specified traverse yield strength of the pipe was obtained by coldworking the steel with internal pressure expanding the steel to specified size.

The resulting pipe had a minimum transverse elongation (in 2 inches) of 22 percent and a minimum transverse yield strength and ultimate strength (according to the pipe wall thickness) as follows:

Wall thickness up to and including 3/8 inches—minimum yield strength, 52,000 pounds per square inch; minimum ultimate strength, 72,000 psi.

Wall thickness greater than 3/8 to 7/16 inches—minimum yield strength, 48,000 psi; minimum ultimate strength 65,000 psi.

Wall thickness greater than 7/16 to



An unsupported pipe line span above a California canyon. (La Goleta pipe line.)

½ inches—minimum yield strength, 46,000 psi; minimum ultimate strength, 65,000 psi.

The expanded steel pipe was made from mill rolled plates which had a minimum yield strength of 40,000 pounds per square inch before undergoing the cold working expansion process. Since in the analysis of pipe span stresses which is to follow, the longitudinal yield strength of the pipe also becomes an important factor, the assumption is made that the expansion process cold works the pipe only in the transverse direction, and that the longitudinal yield strength remains the same as that of the original unworked plate.

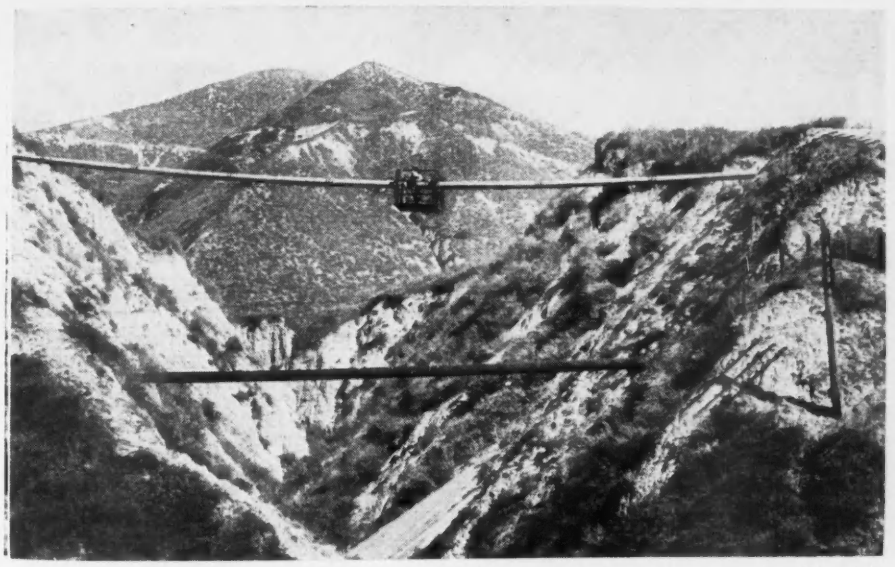
The one further physical test necessary on this pipe in order to establish the maximum allowable gas working pressure for the pipe line is the mill hydrostatic test. Section 2 of the ASA Code for pressure piping provides that the mill test pressure which can be specified is to be based upon the formula

$$P_m = \frac{NKT}{D}$$

where P_m = mill test pressure in pounds per square inch gage
N = a numerical factor, which for the 34-inch pipe herein used as an example can be taken at the maximum allowable value of 1.80.
K = stipulated minimum effective yield strength in pounds per square inch gage.
T = nominal or specified pipe wall thickness in inches.
D = nominal or specified outside diameter of pipe in inches.

The calculation is equivalent to basing the maximum allowable mill test pressure on a stress that is equal to 90 percent of the minimum specified transverse yield strength of the pipe.

With the pipe specified and obtained as above, ASA Code for Pressure Piping allows the pipe line to be operated at a maximum allowable working pressure within the scope of Division 2 at 80 percent of the mill test pressure. This resolves to a maximum operating pressure which develops a stress of 72 percent of the specified minimum yield strength of the pipe. Or converted into a factor of safety based upon the yield strength of the pipe, it resolves to a minimum design factor of safety of 1.39.



Another pipe line span across California gully. Heavy rains turn canyons and gullies into rampaging rivers which can scour out buried lines.

Span Stresses

It is apparent that if a pipe line is designed to operate at the maximum allowable working pressure for the buried sections of the pipe line, any spans made of the same pipe will have a lower factor of safety because of the added stresses. Hence, the design problem is to develop an allowable span structure with adequate factor of safety matching that of the rest of the pipe line system. Economics of engineering design would rule that the span structure should be as strong as the rest of the pipe line when all contributing influences are evaluated.

Stresses which occur in a pipe line span can be listed as follows:

(1) Transverse tensile stress due to internal pressure.
(2) Longitudinal tensile stress due to internal pressure.
(3) Longitudinal compressive or tensile stress due to temperature change.
(4) Longitudinal bending stresses (tensile and compressive) due to beam loading of the pipe in the span.

The first three stress conditions are common both to spans and buried pipe sections, however to a different degree because of differing conditions that occur.

Internal Pressure — Transverse Tensile Stresses. The common method

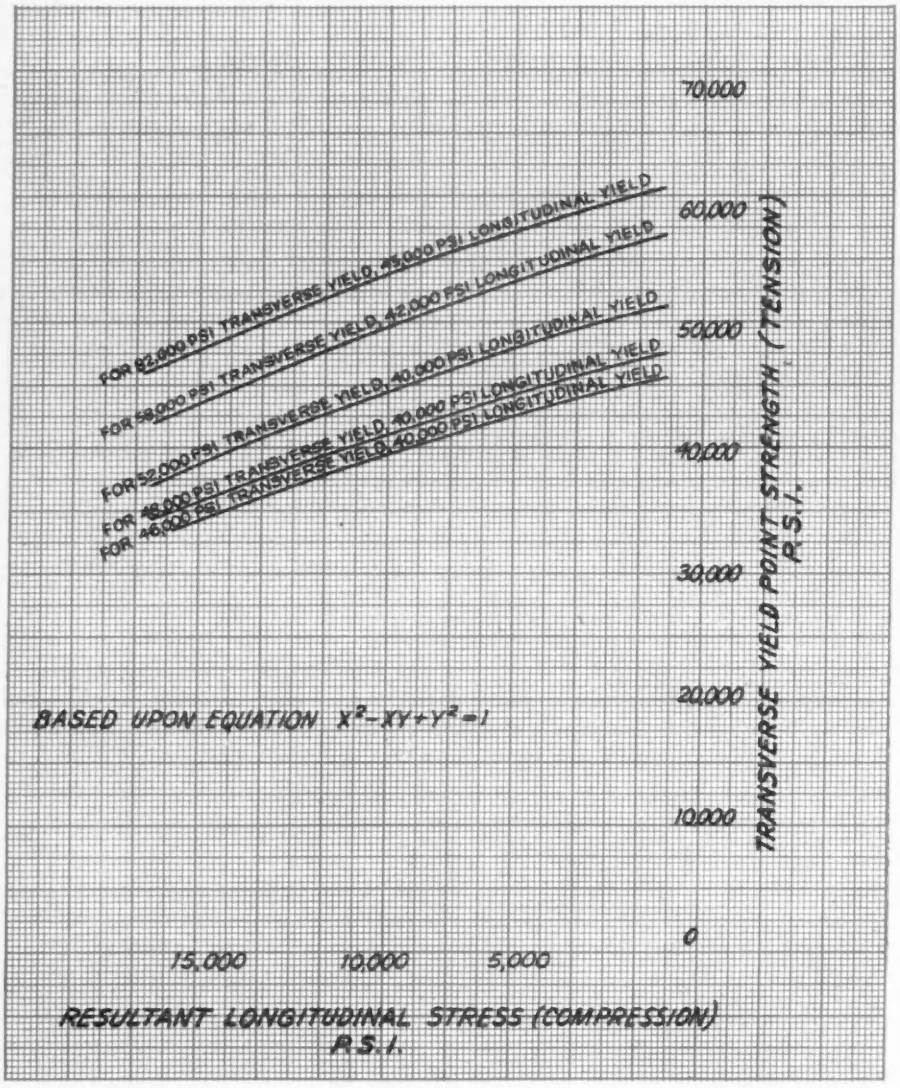


FIGURE 1.

for calculating the transverse tensile stress due to internal pressure on pipe is the Barlow formula. While two accepted variations are recognized, the one chosen for design of this line is based upon the assumption that the maximum stress occurs at the outside diameter of the pipe (see ASA code). This method gives a conservative value for safety factor calculations.

$$S_1 = \frac{PD}{2t}$$

Where S_1 = transverse tensile stress due to internal pressure, psi
P = internal gas pressure, pounds per square inch gage
D = outside diameter of pipe, in inches
t = nominal wall thickness of pipe, in inches

Internal Pressure — Longitudinal Tensile Stresses. The longitudinal tensile stress due to internal pressure is calculated as the longitudinal strain resulting from the transverse tensile stress due to the internal pressure. This is obtained by multiplying the transverse tensile stress by Poisson's ratio, which for steel is taken as 0.3. Such an analysis applies to the calculation of the longitudinal stress in an open end container, such as exists with the pipe line spans:

$$S_2 = 0.30 \times S_1$$

Temperature Stresses. The longitudinal stress resulting from temperature change is due to the restraint of expansion movement and is calculated as

$$S_3 = CE(t_2 - t_1) \text{ or, for steel}$$

$$S_3 = 195(t_2 - t_1)$$

where S_3 = longitudinal stress due to temperature change, psi
$(t_2 - t_1)$ = temperature change, °F
C = coefficient of thermal expansion of steel (6.5×10^{-6})
E = modulus of elasticity of steel (30×10^6)

Where the temperature change is an increase, then the longitudinal stress in the pipe section is compressive. Where the temperature change is a decrease, then the longitudinal pipe stress is tensile.

Beam Stress. The longitudinal bending stresses due to beam loading are calculated on the assumption that the pipe section corresponds to a uniformly loaded beam. For either the unsupported or supported span conditions, the beam is similar to the fixed end condition for which the theoretical calculation for bending stresses (tensile and compressive) is derived as

$$S_b = \pm \frac{1}{12} \frac{WL^2Y}{I}$$

where S_b = longitudinal stress due to beam loading, psi
W = beam loading in pounds per inch
L = span length in inches
Y = pipe radius in inches
I = moment of inertia of the transverse pipe section in (inches)^4

For the application to analysis of pipe line spans, this theoretical calculation has been modified to

$$S_4 = \pm \frac{1}{10} \frac{WL^2Y}{I}$$

This modification is made to offset uncertainties in span construction. During construction of a span, positive attempts should be made to obtain firm bearing soil at the end points of the span. However, it is doubtful that the point of tangency of the pipe line span will occur at the banks of the span crossing, but rather back into the banks some distance. In order to be safe it is suggested that the length of the span be measured from the points of entrance of the pipe span into the banks, irrespective of the exact location of firm bearing soil, and the modification be made in the factor of the stress formula to compensate for the more exact theoretical length of a fixed end span.

This modification is a compromise between the factor 1/12 in the fixed end beam formula and the factor ⅛ in the free end beam formula. It has the net effect of locating the firm bearing soil support points in the banks of ravines back a distance of about 8 percent of the span length, or about 4 percent at each end.

IT TAKES GUTS

NO PLACE FOR A "PANTY WAIST"

Oil operators demand more from their hauling equipment than other industries. For more than 36 years "Spencer" has met the challenge with a product that oil men everywhere have been proud to own. Loadcraft has kept pace with this fast-moving industry with new models.

Pipe, rigs, engines and all hard-to-move equipment is right at home on Loadcraft Trailers. Special models do special jobs but the Tandem Axle semi-float is the favorite with producers. It is built with a frame, axles and brakes that have never known the word "failure."

RUGGED IS THE NAME FOR IT

Loadcraft produces a complete line of pole-type trailers to meet every demand. The tandem with bolster is popular with pipe and rig haulers, and special jobs are available for utilities and contractors.

WRITE FOR DETAILED LITERATURE

TANDEM AXLE POLE TRAILER

SPENCER-SAFFORD **LOADCRAFT, INC.**

AUGUSTA, KANSAS

SUCCESSORS TO SPENCER TRAILER COMPANY . . . ESTABLISHED 1916

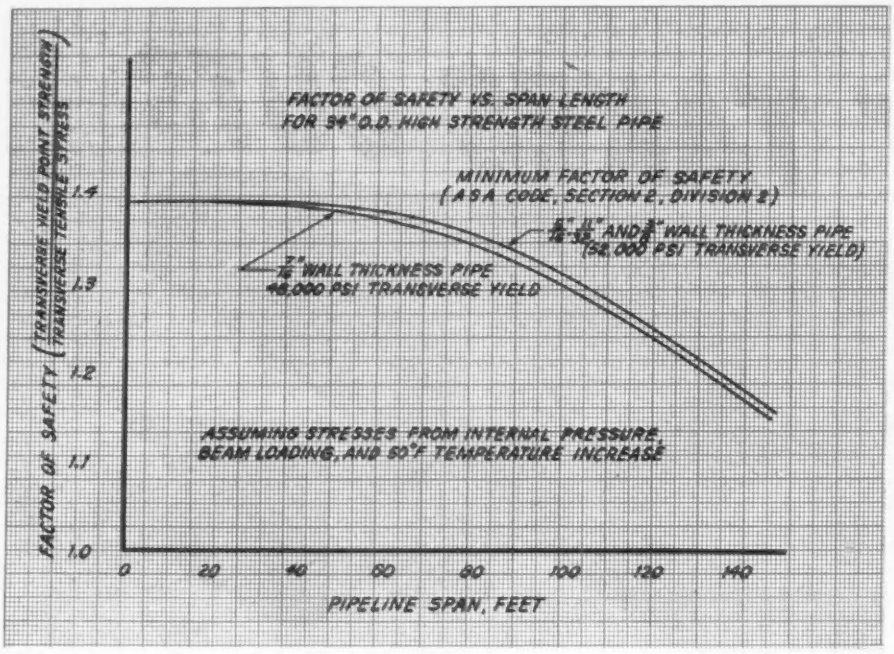


FIGURE 2.

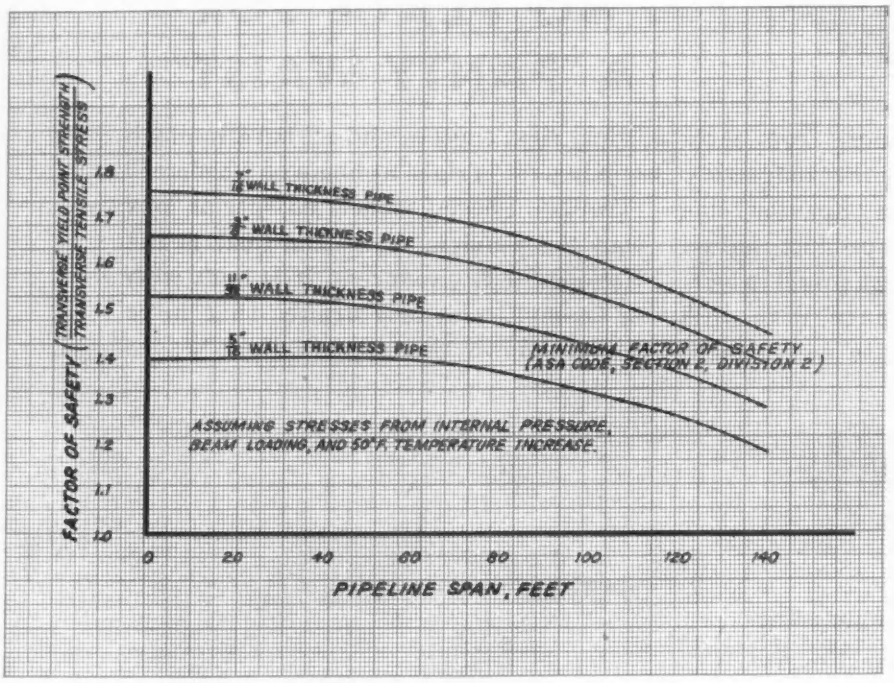


FIGURE 3.

When determining the beam loading of the span, include the weight per foot of the pipe, the weight of the compressed gas, and the horizontal wind loading on the pipe. The vertical and horizontal loadings should be combined as the vector sum to obtain the resultant loading to be used to calculate the beam bending stresses.

Combined Stresses. The calculations for the separate components of the stress loading in a span are relatively simple. However, the combining of these various stresses into a net resultant stress which determines the factor of safety of the design is more difficult analysis. As can be seen, certain of these stresses are transverse to the pipe, while others are longitudinal. And in addition there is the plus and minus combination of tensile and compressive stresses. Complicating this situation in the case of expanded steel pipe such as that used on the Topock-Milpitas gas main, is the difference in yield strength of the pipe material in the transverse and longitudinal directions.

Test information[1] and studies[2] have shown that when a plate is stressed by tensions at right angles to each other, the allowable stresses in the two directions will be somewhat higher than if the plate were stressed in one direction only. Similarly, if a compression stress acts at right angles to a tension stress, the allowable value of the tension stress must be reduced because of the presence of the compressive stress. The result of these phenomena is that the analysis of the combined stresses occurring in a pipe span must recognize that any longitudinal compressive stress will reduce the transverse (or circumferential) yield strength of the pipe.

As a result of studies of the phenomena, an equation has been developed[2] which mathematically describes the variation of the allowable tension stress under conditions of tension or compression stresses occurring at right angles to the primary stress. This equation is

$$x^2 - xy + y^2 = 1$$

where the y coordinate is the primary stress (in our application the transverse yield strength of the pipe) and the x coordinate is the right angle stress (in our application the longitudinal stress in the pipe). Figure 1 shows this equation plotted for the particular yield strength constants which apply to the expanded steel pipe supplied for the Topock-Milpitas gas main.

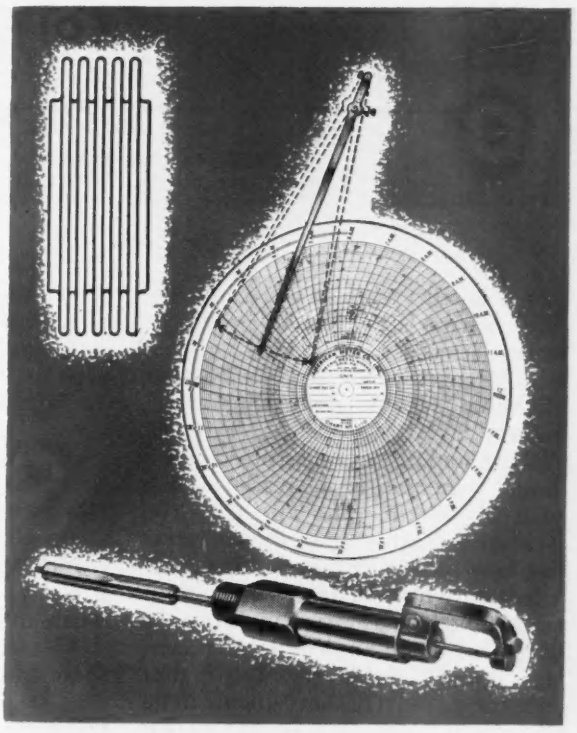
When combining the various stresses that are calculated as occurring in the pipe line spans, certain stresses are found to be offsetting. The longitudinal *tensile* stress due to pressure in the pipe happens to be equal approximately to the longitudinal *compression* stress resulting from a 50° F. temperature rise. At this condition this cancellation effectively eliminates all the longitudinal stresses except for those resulting from the beam bending stress. When combining the various stresses, it goes almost without saying that the designer must evaluate all possible combinations of pressure, temperature and loading which may occur at a particular span and determine the resulting allowable span length accordingly. For conditions where the temperature change is a decrease, the resultant longitudinal stress is tensile. The combined longitudinal tensile stresses then tend to offset the compressive longitudinal stress resulting from the beam loading, and a lesser reduction in the transverse factor of safety of the pipe will occur.

Figure 2 shows a plot of the factor of safety versus span length for the 34-inch O.D. pipe of various wall thicknesses which was purchased for the Topock-Milpitas gas main. This

DRI-FLO ORIFICE METER

BELLOWS DIFFERENTIAL PRESSURE INSTRUMENT

THE AMERICAN WESTCOTT MERCURY MANOMETER ORIFICE METERS



- **ONE-PIECE STAINLESS STEEL BELLOWS CONSTRUCTION**

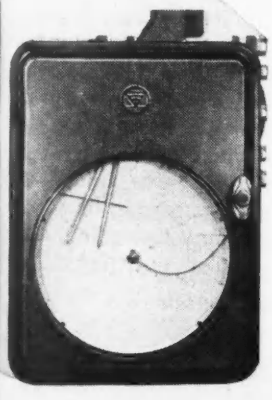
  Large area, fluid filled, *seamless* stainless steel bellows provide longer service life with minimum possibility of leaks caused by metal fatigue.

- **DIRECT FULL SCALE RECORDING PEN MOVEMENT— NO EXTERNAL GEARING OR LINKAGE MULTIPLICATION**

  Recording pen arm travels through the full 22½ degree arc without complex external gearing or linkage multiplication. Standard American Westcott charts are used.

- **AMERICAN TYPE "B" TEFLON SEAL STUFFING BOX NEEDS NO LUBRICATION**

  Noted for simplicity, this nearly frictionless precision unit provides maximum accuracy . . . *Requires No Lubrication.* All stuffing box parts are removable and replaceable in the field . . . *No Shaft Freezing; No Leakage.*



- **STAINLESS STEEL INTERNAL WORKING PARTS**

  All internal operating parts of the new DRI-FLO Orifice Meter are of stainless steel except the ground and polished stuffing box shaft which is Monel metal. Body is cast steel.

- **READILY ACCESSIBLE FOR CLEANING**

  The meter body and internal working parts are easily accessible for inspection, calibration and cleaning by removing one or both case cover heads . . . without disturbing manifold piping.

AMERICAN METER COMPANY
INCORPORATED (ESTABLISHED 1836)

AMERICAN METER COMPANY EST. 1836 MEASUREMENT ENGINEERS

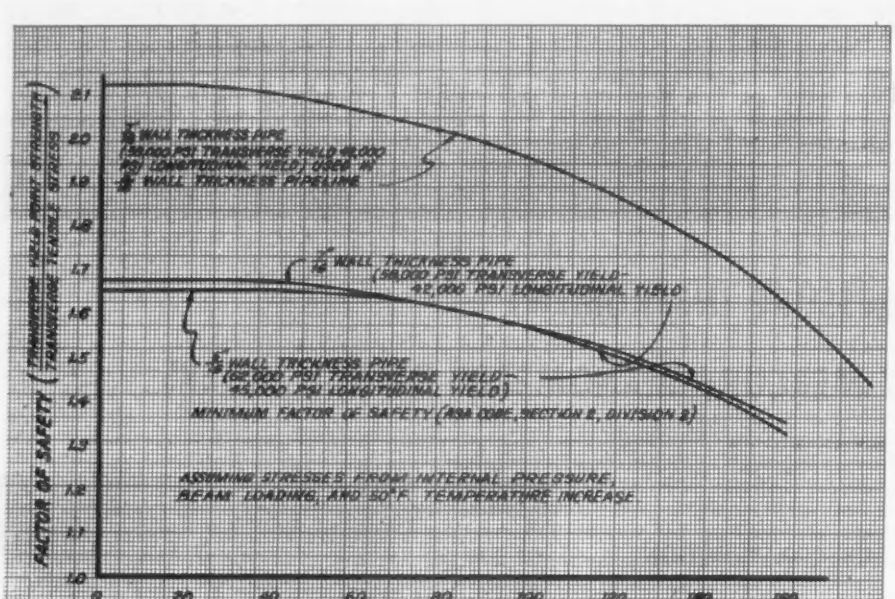


FIGURE 4.

plot is based upon gas working pressures which develop a transverse tensile stress of 72 percent of the yield strength of the pipe (maximum allowable according to Division 2, Section 2, ASA Code for Pressure Piping) and upon an assumed maximum temperature increase at the span of 50° F. The effect of the increasing magnitude of the compressive longitudinal stress resulting from increased length of span can be seen in the plotted decrease in factor of safety as the span length increases. It is obvious from this chart that only comparatively short spans can be allowed in a pipe line of this design without introducing weak points which seriously lower the factor of safety of the pipe line.

Design Application of the Stress Analysis. Now that a method of analysis has been developed which provides a procedure for combining the various stresses occurring in a pipe line span, studies can be made of various alternate span designs which might be suggested to increase the length of allowable spans. One such proposal might be the use of heavier wall thickness pipe in the span sections. Figure 3 shows the results of such a study. This chart again uses the 34-inch O.D. pipe and in this case applies to the use of increased wall thickness pipe in spans which would occur in a basic 5/16-inch wall thickness section of the pipe line. A similar assumption to that of Figure 2 was made for the temperature increase of 50° F. at the span. With thicker wall pipe used in this manner at the spans, the analysis shows that for a particular span length the net compressive stress obtained after combining the calculated longitudinal stresses due to internal pressure, temperature and beam loading is greater than when the pipe is operating at higher pressures. As a result the transverse yield point strength of the pipe in the span is less. However, since it is a heavier wall section of pipe, the actual transverse tensile stress due to internal pressure is less in proportion, so that an increase in factor of safety results.

The same beneficial results can be shown for any portion of the pipe line, no matter what the basic wall thickness for the pipe line section might be. In the case of the 34x7/16-inch or ½-inch wall pipe, a decreased benefit results because of the lower value of the minimum specified transverse yield strength of the pipe which we are using for an example. However, this study shows that spans up to 140 feet might be considered acceptable using 34x7/16-inch wall thickness pipe in the 34x5/16-inch pipe line section, without incurring a factor of safety at the span which is less than that of the buried pipe line section.

Another span design which might be suggested in order to obtain an increased length of allowable span could be the use of pipe which physical tests have shown to be of better quality than the minimum standards that the pipe specifications have required. Experience with the 34-inch pipe on the Topock-Milpitas pipe line has shown that on frequent occasion pipe will be obtained with physical strengths considerably above the minimum values established in the specifications. Figure 4 shows the results of such a study where it has been assumed that pipe with higher values of transverse yield strength and longitudinal yield strength was available. As in the previous charts, a temperature increase of 50° F. at the span has been used. Also the internal pressure corresponding to 72 percent of the minimum specified transverse yield strength of the pipe line section has been used (maximum allowable according to Division 2, Section 2, ASA Code for Pressure Piping). This study shows that spans up to 150 feet might be considered acceptable using the same wall thickness of pipe for the spans in a pipe line section when the pipe is selected specially for this application.

As might be expected, a combined study of the use of heavier wall thickness pipe and higher than average physical test pipe will show a further increase in the allowable length of pipe line span. This is indicated by the curve for 7/16-inch wall thickness pipe used in a 5/16-inch wall section pipe line which is shown in Figure 4.

In conclusion, perhaps two precautionary comments should be made. The first is that this method of analysis of pipe line span design should not be considered as the only analytical study which is necessary when designing spans. All mention of supported spans has been intentionally omitted since other factors in addition to those which have been presented here enter into the design studies when supports are being considered. In addition we have said nothing about the magnitude of longitudinal compressive stresses which might be considered limiting in this pipe line span design. In the application to the 34-inch Topock-Milpitas pipe line we have considered this stress to be limiting at values of about 20,000 psi, or a factor of safety of 2 based upon the longitudinal yield strength of the pipe. In this application this was a safe value since the physical sizes and span lengths were such as to rule out any concern about pipe buckling under compressive loads.

REFERENCES

[1]U. S. Department of the Interior, "Boulder Canyon Project, Final Reports, Part IV—Design and Construction, Bulletin 5, Penstocks and Outlet Pipes," Page 82.

[2]Marin, Joseph, "Failure Theories of Materials Subjected to Combined Stresses," Transactions ASME, Volume 101 (1936), Page 1162.

ACKNOWLEDGMENTS

This article is from a paper presented before the Pacific Coast Gas Association meeting in Berkeley, Calif.

Acknowledgment is made to J. B. Cooke and Simon Peters, both of the engineering department, Pacific Gas and Electric Company, San Francisco, for the original studies which developed this analysis of pipe line span stresses, and for their guidance in applying this analysis to the design of the 34-inch Topock-Milpitas gas transmission main.

Production tool for stronger pipe

One of the most important tools used to make Basalt-Kaiser line pipe meet your rigid specifications is—*water!*

Large diameter Basalt-Kaiser pipe is clamped in steel dies and hydraulically expanded by water under great pressure to assure accurate diameter, concentricity and straightness.

Because of this additional cold working, Basalt-Kaiser pipe is further strengthened to fulfill your requirements for high yield strength.

And after the dies are opened, high pressure is maintained in the pipe while measured blows are struck along the seam to test the strength of the weld.

This is only one of the exacting tests Basalt-Kaiser pipe must pass before it is delivered to you. Another good reason why experienced line men know:

It's good business to do business with

Kaiser Steel

KAISER STEEL PIPE SPECIFICATIONS • All pipe manufactured to latest A.S.T.M. and A.P.I. specifications

Type	Diameter	Length	Wall Thickness	Shipping Point
Continuous Weld—Threaded and Coupled	½" to 4" nominal I.D.	Uniform 21'	Standard	Fontana, Calif.
Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	8⅝" to 20" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5 9/16" to 12¾" O.D.	Up to 55'	.188" to .400"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	22" to 30" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser

Prompt, dependable delivery at competitive prices • KAISER STEEL CORPORATION Los Angeles, Oakland, Seattle, Portland, Houston, Tulsa, New York

Four-Point Engine Control Saves Operating Expense

Four Simple Instruments Can be Used to Test And Adjust Engines to Obtain Top Efficiency

By HAROLD L. JOHNS

Field Engineer

Thompson Products, Inc., Tulsa

About the Author

HAROLD L. JOHNS has represented Thompson Products, Inc., in Tulsa and the Mid-West for the past eight years. He has devoted considerable time to studying means for improving engine performance and has conducted a number of classes in the subject. Before going with Thompson Products, Inc., he was employed by Lone Star Gas Company in the Compressor department, working in Oklahoma and Texas.

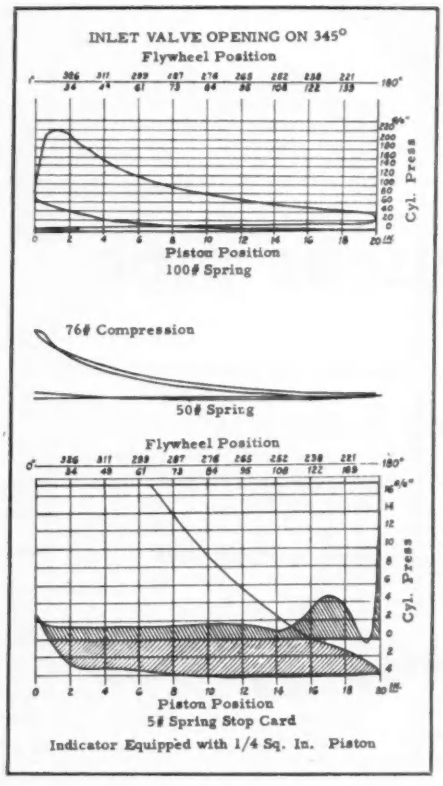


FIGURE 1

Inlet Valve opening on	345°	
RPM of Engine	200	
IHP of Power Cylinder	101	
Throttle Setting	Full	
Exhaust Analysis CO_2	8.0	
O_2	1.0	
CO	0.0	
Area of Shaded Section under Atmospheric Line	1.24	Sq. In.
Area of Shaded Section above Atmospheric Line	.65	Sq. In.
Negative HP Intake Stroke	4.14	
Negative HP Exhaust Stroke	2.16	
Total Negative HP	6.30	

FOUR instruments can be used to test and adjust internal combustion engines. They are an exhaust gas analyzer, a gas engine indicator, a dial indicator and a neon timing light. In a series of tests where these instruments were used, a number of 18-inch bore and 20-inch stroke, twin-cylinder, single-acting, four-cycle engines were adjusted to give top operating performance. Uniformity in cooling, lubrication, and apparent state of mechanical repair seemed to prevail throughout this particular engine room, yet there was a wide range in the loads the various engines would carry. The engine giving the poorest performance was selected for initial tests.

The first step was to fasten the dial test indicator to the cross head of the engine. It indicated that the crank pin on the left was off five degrees from the right of true dead center. The remedial step was to stencil the left side of the flywheel for the left cylinder and the right side of the flywheel for the right cylinder. Then, following manufacturer's specifications, corrections were made to both ignition points and to the opening of inlet valves. When the engine was again started and loaded, a distinct improvement in operation was apparent.

This particular type engine has a camshaft for each cylinder which is common for the inlet and exhaust valves. When the opening and closing of the inlet valve is retarded the opening and closing of the exhaust valve is automatically retarded.

The magneto, which is an oscillating type was set on the recommended point by barring the engine over until the magneto tripped. However, this setting proved incorrect. With the engine in operation, the neon light indicated an ignition point lag of 17 degrees between tripping point and that shown with the neon light with the engine running at 200 revolutions per minute. This proved the practice of making the final setting of the ignition with the neon light was desirable.

The exhaust gas analyzer was used to set fuel mixtures. In order to increase the life of exhaust valves and power piston rings, the fuel-air mix-

Only BARRETT gives you these

two big services

for better pipe protection

1 The Barrett Field Manual

2 On-the-Job Technical Aid

When you buy Barrett* Coal-Tar Enamels, you get the best pipe-protection products on the market. But even finest enamels must be properly applied for best *protection.*

That's why it's so important to take advantage of the two Barrett services designed to help you *get* best protection. They're yours for the asking—the Barrett Field Manual, which gives detailed procedures for proper application—from cleaning to back-filling—and on-the-spot service by a Barrett Technical Service Representative.

Barrett Coal-Tar Enamels, plus these two services, are a sure-fire combination.

Phone, wire, write for complete information.

Check this list of Barrett Coal-Tar Enamel advantages

The right product and procedure for every gas and oil pipe line need
Resistance to extreme atmospheric temperatures
High ductility and flexibility
High resistance to soil stresses
High dielectric properties
Moisture impermeability
Resistance to gas or petroleum attack
Easy availability and application
On-the-job technical assistance
Dependable deliveries

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

In Canada:
The Barrett Company, Ltd.
5551 St. Hubert St., Montreal, Que.

Barrett*

**Reg. U. S. Pat. Off.*

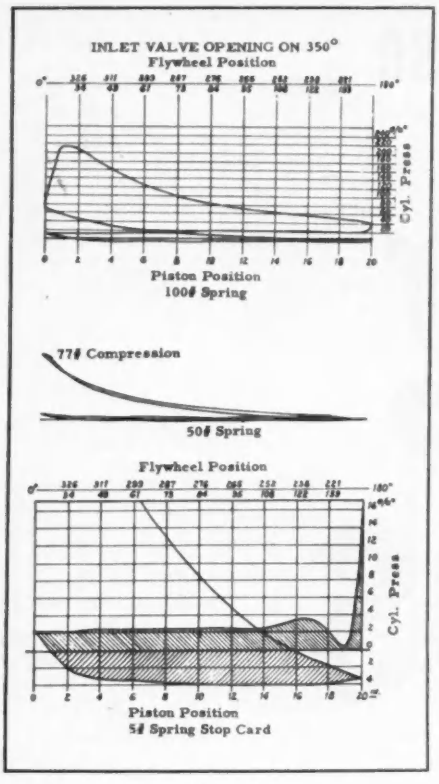


FIGURE 2

RPM of Engine	206
IHP of Power Cylinder	102.4
Throttle Setting	13/16
Exhaust Analysis CO_2	12.0
O_2	1.0
CO	0.0
Area of Shaded Section under Atmospheric Line	1.095 Sq. In.
Area of Shaded Section above Atmospheric Line	0.970 Sq. In.
Negative HP Intake Stroke	3.78
Negative HP Exhaust Stroke	3.34
Total Negative HP	7.12

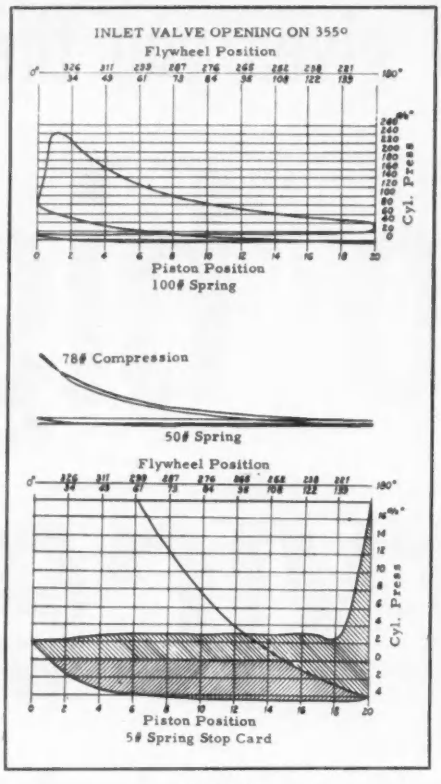


FIGURE 3

RPM of Engine	206
IHP of Power Cylinder	106
Throttle Setting	25/32
Exhaust Analysis CO_2	11.6
O_2	1.8
CO	0.0
Area of Shaded Section above Atmospheric Line	1.265 Sq. In.
Area of Shaded Section above Atmospheric Line	0.970 Sq. In.
Negative HP Intake Stroke	4.35
Negative HP Exhaust Stroke	4.22
Total Negative HP	8.57

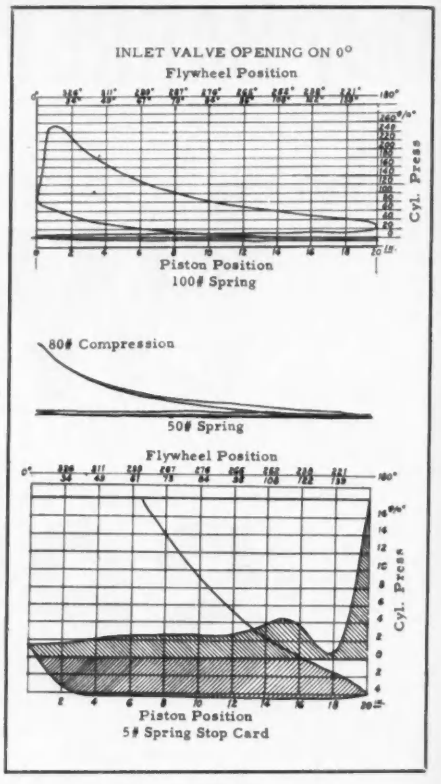


FIGURE 4

RPM of Ergine	208
IHP of Power Cylinder	109
Throttle Setting	3/4
Exhaust Analysis CO_2	12.4
O_2	0.8
CO	0.0
Area of Shaded Section under Atmospheric Line	1.425 Sq. In.
Area of Shaded Section above Atmospheric Line	1.11 Sq. In.
Negative HP Intake Stroke	4.93
Negative HP Exhaust Stroke	2.85
Total Negative HP	8.78

tures were set on the lean side. The exhaust gases were left with a trace of O_2, commonly called excess air. Some operators leave as much as eight percent excess oxygen in exhaust gases to lower maintenance costs.

Before taking indicator cards the indicator motion should be synchronized with the travel of the power piston, and true dead center established by use of the dial test indicator. In each test there should be at least three indicator cards: a power card made with a 100 pounds per square inch spring, a compression card with a 50 psi spring with the ignition shorted out, and a valve motion or light spring made with a 5 psi spring. With each test set of cards a sample of the exhaust gases should be taken and analyzed from a point as close to the exhaust chamber as possible.

In Figure 1 the opening of the inlet valve was set on 345 degrees as recommended by the engine manufacturer. With this setting the engine had a compression pressure of 76 psi and a terminal pressure (that pressure recorded at the end of the exhaust stroke) of 2½ psi. In Figures 2, 3 and 4 the opening of the inlet valve was retarded in five-degree steps (which retarded the closing of the exhaust valve a like amount), the compression pressure rose from 76 to 77 to 78 to 80 psi. The terminal pressure dropped from 2½ psi to 2 and from 2 to 1½ psi, which seemed to be the best setting for this engine using the old camshaft. It is probably best to follow the engine manufacturer's recommendations in setting valve timing when an engine is new but when an engine has operated for years and wear has taken its toll the operator is faced with an entirely different problem.

Indicated Horsepower

The engine under test was running on a full throttle and developing 101 positive indicated horsepower and 6.3 negative indicated horsepower during the test in Figure 1. During the test in Figure 4 the positive indicated horsepower was up to 109 with the negative indicated horsepower only up to 8.78. That old rule—decrease negative horsepower to increase positive horsepower—would hold true on a new engine on a test block, but in the plant, as in this case, it isn't always true.

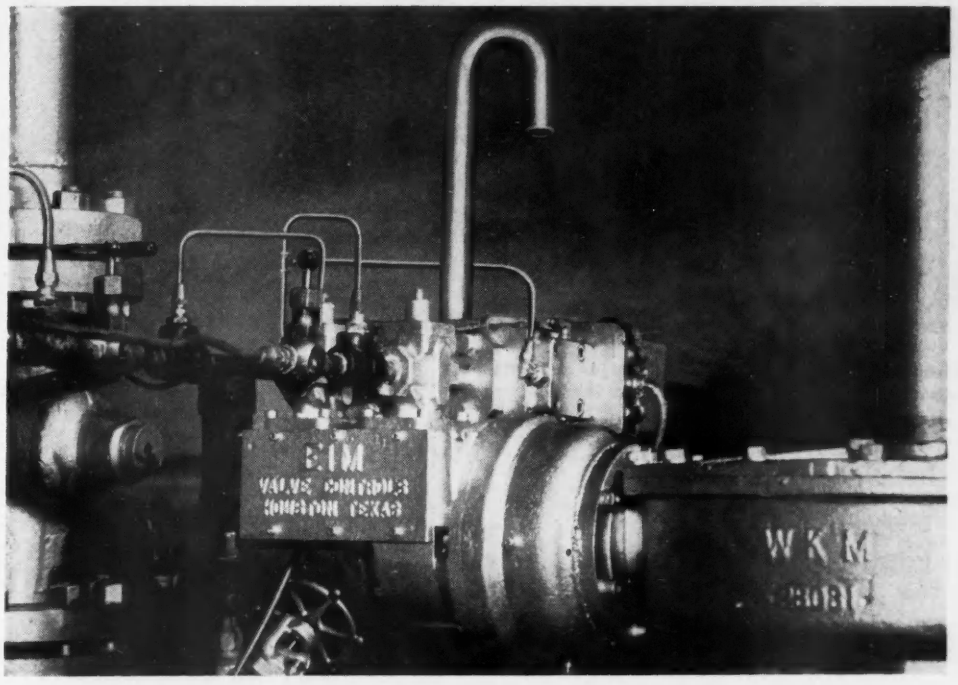
This test together with many others became a convincing force, leading to the following conclusion: When an engine has a common inlet and exhaust camshaft and wear is present, it is expedient to sacrifice the reduction in negative horsepower if the inlet valve was opened early, and to retard the opening of the inlet valve in order to retard the closing of the exhaust valve, thereby reducing the terminal pressure at the end of the exhaust stroke.

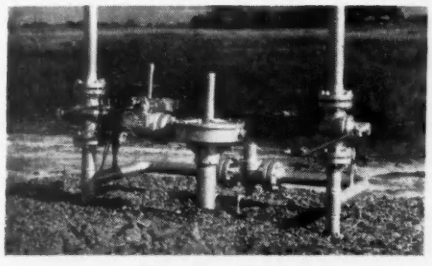
A cycle does not begin with the admission stroke on the opening of the inlet valve, but with the trapping of inert gases in the cylinder when the exhaust valve closes. These gases, left over from the previous cycle, tend to dilute the new charge being taken into the cylinder. Their effect must be considered.

Flame propagation will be slower because the mixture is slow burning, the terminal pressure will be higher and peak pressures will be lower, eliminating the opportunity for the

■ CONTINUED ON PAGE 234

PROGRESSIVE PIPE LINERS *specify* E-I-M G-2 PIPE LINE VALVE CONTROLS





E-I-M Valve Control operated by FM radio:

Pictured above is a recent E-I-M installation on the Texas Gulf Coast. This 16" high pressure gate valve is opened and closed by the E-I-M control operating on VHF radio. This installation is a forward step in the progress of radio as a control and telmetering medium for high pressure gas line. E-I-M is proud its pipe line valve control was the one selected for installation on this modern pipe line.

The E-I-M G-2 Pipe Line Valve control is the foolproof answer to your plug valve and gate valve control problems, and it can be installed on existing valves in the field.

The E-I-M valve control takes its source of power from the medium in the transmission line without any pressure reduction. It has unmatched reliability, can be mounted in any position, horizontally or vertically, and can be applied to any make or type valve.

There are no small parts in the E-I-M valve controller, and for this reason the control requires the minimum of attention and can be easily inspected and maintained. It's a compact unit with all piping, valving and controls integrally arranged. Since the G-2 Control has all of its piping and gas passages contained in the unit, field piping is kept to a minimum. Actually only one small line from the pressure source to the control is required.

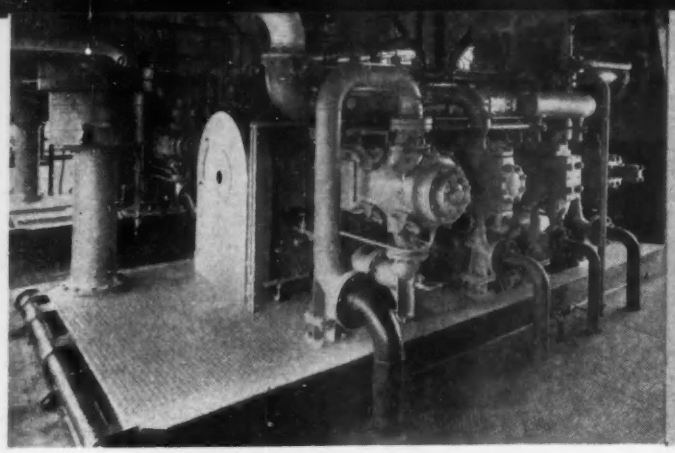
E-I-M valve controls have been used successfully on many major pipe lines. They can be operated manually, electrically or automatically. And there is a whole family of E-I-M standard control devices from which engineers may design their own custom-built valve control schemes, if they wish.

If you have a pipe line valve control problem, check with E-I-M first. E-I-M valve controls offer you flexibility of installation and operation. Remember they can be installed on your present valves in the field. Write for our descriptive folder on the G-2 valve control.

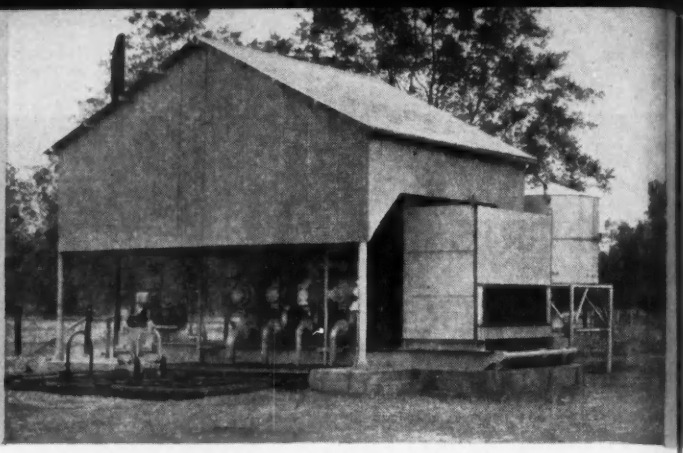
E-I-M Company INCORPORATED

1340 OLD SPANISH TRAIL • HOUSTON 21, TEXAS • MOhawk 4587

Valve Controls • Speed Reducers • Cooling Tower Drives • Control Valves



Two Clark Midget Angles furnishing gas for gas lift service and to recycling plant at Cranfield, Miss.



Battery Two, Lake St. John Field, La.: Clark Midget Angle supplying gas to the Lake St. John gasoline and recycling plant.

Perfect Balance and S

. . . explain Clark Midget Angles' success in The California Co.'s Bayou Country operations

Bayou country, rich in oil and gas but difficult for men and machines to work. That is the story of producing operations in the southern part of Louisiana and Mississippi. The California Company, however, has found the practical answer to the flare gas and gas lift problem in these rich producing fields.

Seventeen Clark 300 bhp Midget Angle "skid-mounted" compressor stations are now operating under extremely rugged conditions. Because of perfect balance, only a slab of concrete is needed for a foundation. Several of these skid-mounted units are even operating on small 18-foot x 36-foot, floating steel barges. Most of these field compressor stations are operated in isolated locations, with only a minimum of service and attention. It is readily apparent why a compressor selected for this toughest kind of service must be inherently rugged and durable. Only the Clark Midget Angle matches these service requirements perfectly. An on-stream average of 97 per cent of the time is proof of dependable performance.

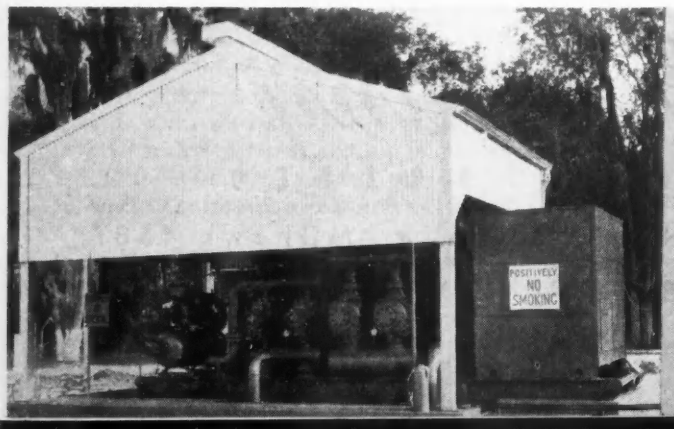
If you have a problem involving 80 to 330 bhp gas-engine-driven compressors, for hard field service, investigate the Clark HMA for the most practical answer.

CLARK BROS. CO., INC. • OLEAN, N. Y.

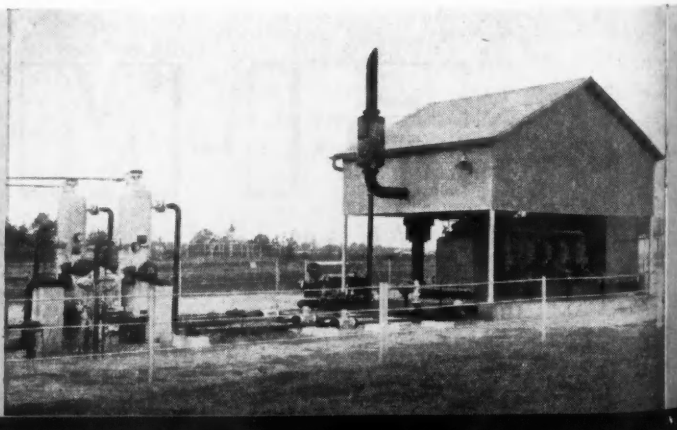
One of the Dresser Industries

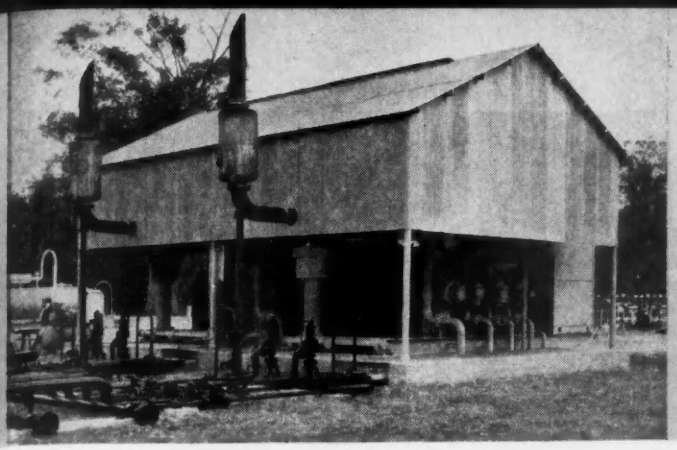
OFFICES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

Barataria, La.: Clark Midget Angle pumping flare gas into a natural gas pipeline.

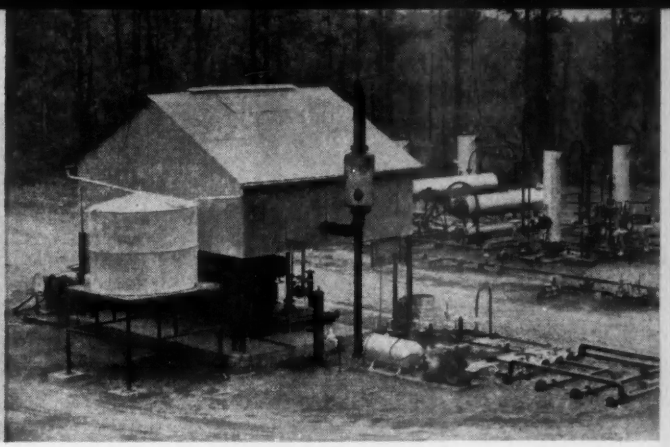


Brookhaven, Miss.: Clark Midget Angle discharging at 2500 psi into injection wells shown in background.





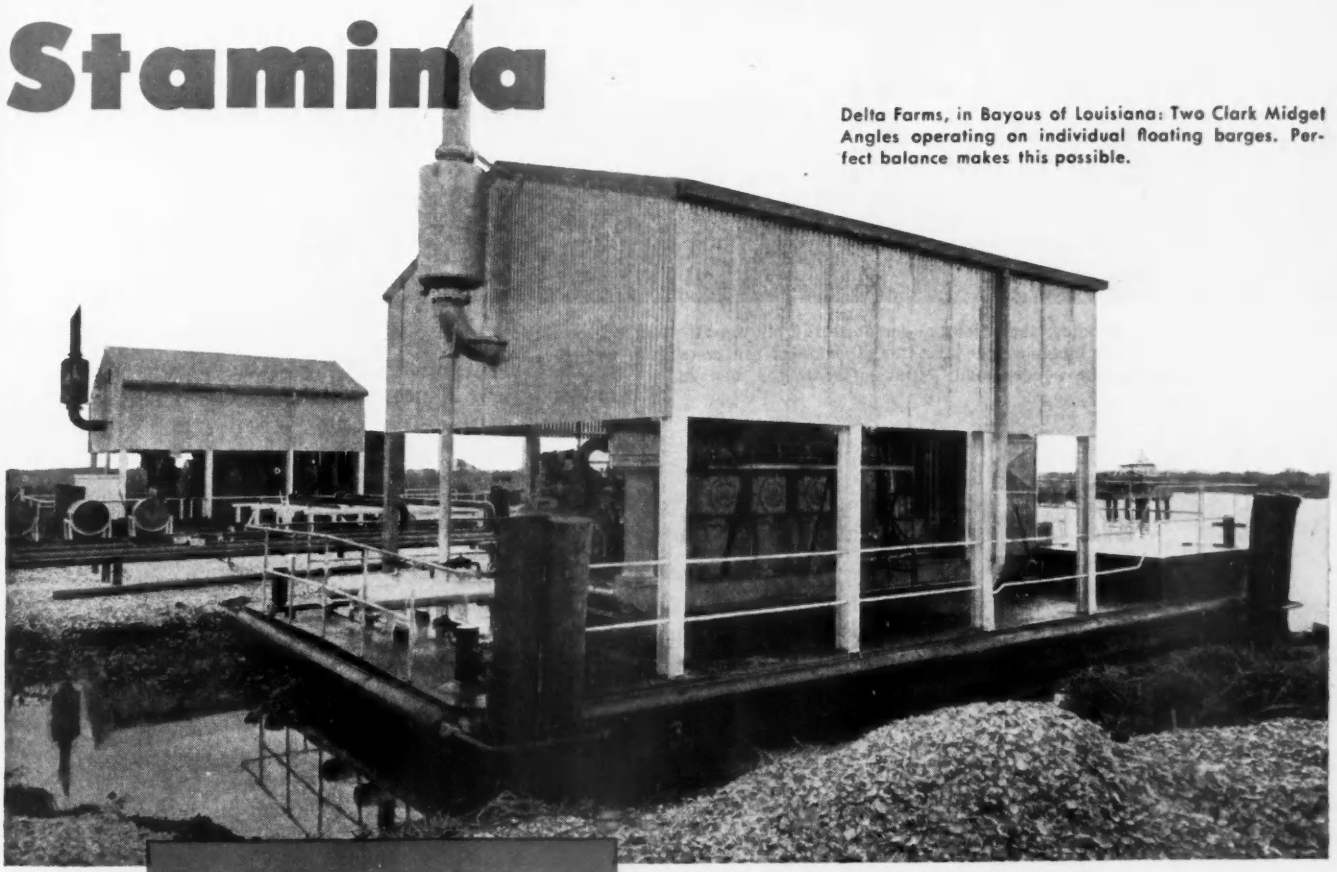
Battery Four in Lake St. John Field, La.: Two Clark Midget Angles furnishing gas for gas lift services and for gasoline plant at nearby Lake St. John.



Clark Midget Angle handling 2-pressure services of field gas for Cranfield, Miss. recycling plant.

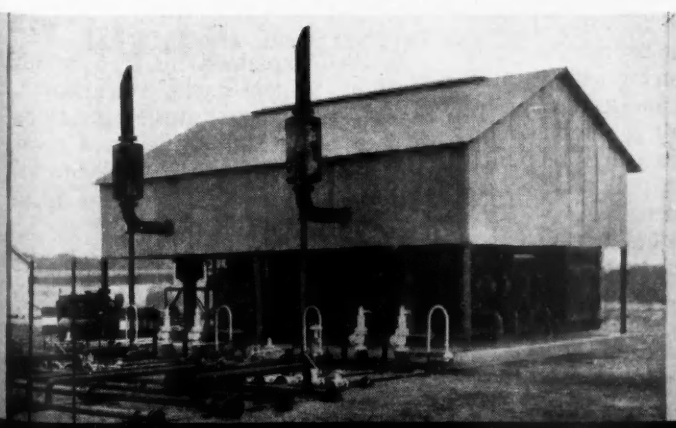
d Stamina

Delta Farms, in Bayous of Louisiana: Two Clark Midget Angles operating on individual floating barges. Perfect balance makes this possible.

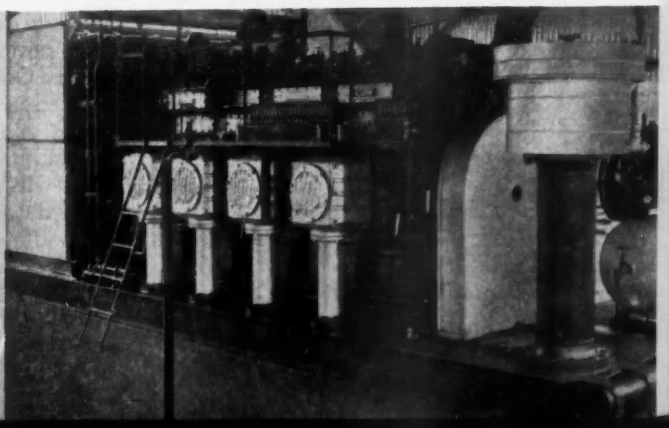


CLARK® compressors

Two Clark Midget Angles supplying gas through 2-pressure services to nearby Lake St. John recycling plant.



Hico Knowles, La.: Clark Midget Angle supplying gas through 2-pressure service for nearby recycling plant.



Safety supervisor Holley Bradley, the inventor, demonstrates his wooden man at the company's Tulsa machine shop. Safety meeting scheduled for 20 minutes ran more than an hour. Bradley says the wooden man "tends to loosen the men up."

Meet Samson

If Men Are Moaning "Oh, Our Aching Backs" Here May Be the Cure for Your Problem

By CARL I. HUSS

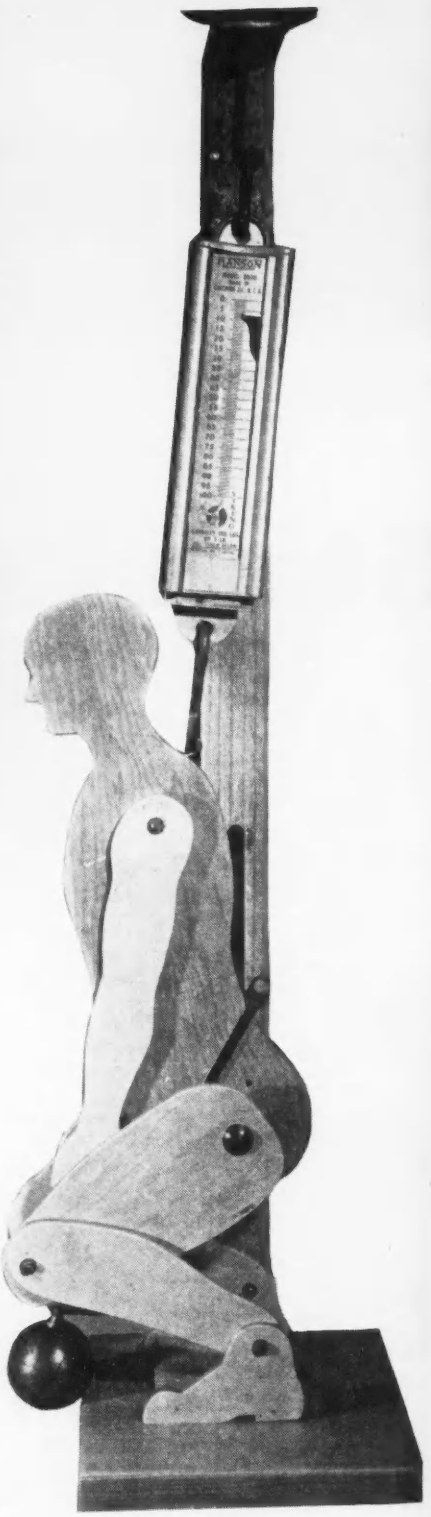
Editor, The Connecting Rod
Service Pipe Line Company, Tulsa

IN THE first six months of 1951 Service Pipe Line Company employes suffered 12 back injuries. Six of them were disabling and the men lost 107 days from their jobs.

The company was alarmed. Back injuries were very much out of proportion to the normal ratio of back injuries to other industrial injuries. For instance, during the entire year 1950 back injuries totaled ten nondisabling and three disabling.

"Physical ailments such as muscle weakness, arthritis and organic disturbances sometimes contribute to back injuries," General Manager C. M. Scott pointed out in a memorandum to all supervisors. "More often, the direct cause can be traced to improper lifting positions . . ."

What the men needed was a device to drive home to them the correct method of lifting. Safety Supervisor Holley Bradley went to work. He had seen posters put out by the National Safety Council picturing wooden men jointed in the arms and legs. Why, he wondered, couldn't a wooden man jointed in the arms and legs be built? And why couldn't a pull scale be attached to the wooden man's back to show how much pull actually is exerted on the back muscles by improper lifting?

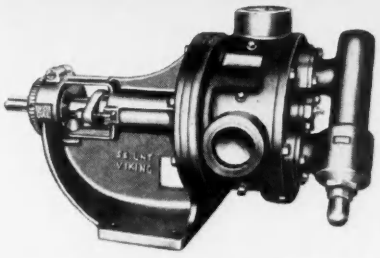


A side view of Samson. When he is lifting correctly with his legs, the scale is attached to hook on shoulder as shown in this view.

Bradley explained his idea to his assistant, Sylvan Starks, a draftsman. Starks was able to transfer Bradley's idea to paper. Buryl Fisher, a company carpenter, followed Starks' drawings and made the man from plywood.

The wooden man stands 36 inches high and weighs four pounds, which

VIKING *Truck Mounting* PUMPS



The new improved Viking Truck Mounting Pump incorporates outstanding features: an improved bracket base with extra long packing chamber; a new style double supported valve on head; a revolvable type pump case which allows complete selection of ports. Available in units from 35 GPM to 300 GPM sizes. Write for literature.

Distributor

SOUTHERN ENGINE & PUMP COMPANY

MANUFACTURERS • MACHINERY FACTORS • CONTRACTORS

Houston — Dallas — Kilgore — San Antonio
Edinburg — Corpus Christi, Texas

Handiest Location in PITTSBURGH

Hotel Pittsburgher
PITTSBURGH, PA.

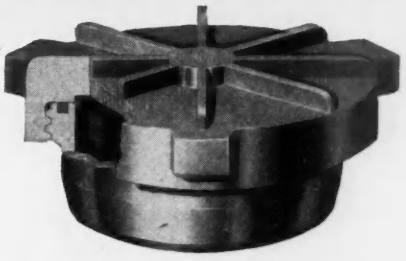
Right in the heart of town

Make the PITTSBURGHER your stopping place on every motor trip. Located right in the heart of town . . . easily reached from all major highways. Enjoy the finest in modern facilities, too . . . 400 rooms each with free radio, bath and circulating ice water; 125 rooms with television. Garage service.

a Knott Hotel

JOSEPH F. DUDDY, MANAGER

THIS MODERN *2-Piece Union* OFFERS *Money-Saving Advantages*

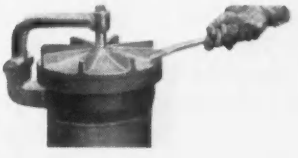


Yale's O-Ring sealing principle (patents pending) makes possible this truly modern blank cap union. The many advantages it offers add up to greatly increased efficiency . . . and that's the reason so many lines are now installing YALE 2-Piece Unions on strainers, scraper traps and manifolds.

LIGHTER!

. . . and stronger, also, and there's no loose, unnecessary pieces to lose or damage.

NO HAMMERING OR BOLTING



A positive pressure seal is obtained by snapping up the cap.

SAFER TO HANDLE

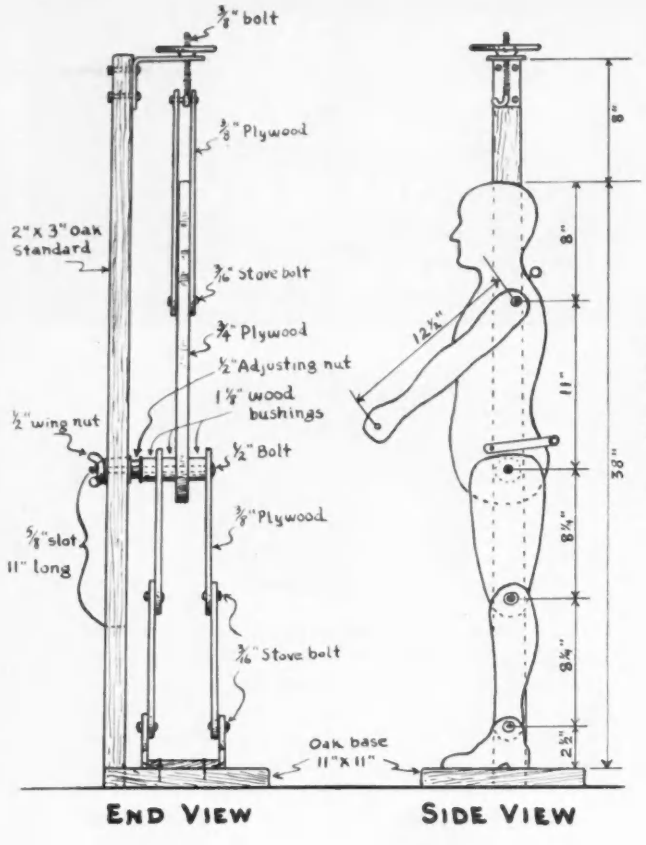
The solid, one-piece cap is made up, broken out, opened and closed without undue exertion or danger.

WRITE TODAY FOR COMPLETE INFORMATION

YALE
MACHINE WORKS

Telephone ME-4282 - P. O. Box 10117
HOUSTON 7, TEXAS

EXPORT: R. S. STOKVIS & SONS CO., NEW YORK, N. Y.



Here's how to build the wooden man. Inventor Bradley doesn't plan to patent the contraption. Drawing is by Sylvan Starks, Bradley's assistant.

makes him quite easy to move. His hands are designed so a four-pound steel ball may be attached to them to demonstrate the correct method of lifting.

"Hercules" or "Samson," as some of the pipeliners have dubbed him, made his first public appearance at a Missouri supervisers' meeting. He was an instant success.

"He brought on more interest and comment than any other exhibit or display we've shown," Bradley said.

Bradley invited engineers in the audience to point out any technical flaws in the man; they could find none. In demonstrating the man, Bradley attaches the scales and ball to the wooden man. (The scales are ordinary pull scales, obtainable at most hardware stores, and are calibrated in pounds from zero to 100.) He then causes the wooden man to lift the metal ball by straightening its legs—the correct lifting procedure.

The scale shows the man exerts an eight-pound pull, four pounds for the ball and four pounds for the wooden man's weight, when lifting correctly.

"Now, what do you think will be the strain on his back when he lifts incorrectly, that is, with his back instead of his legs?" Bradley asks the audience. Guesses range from 20 to 100 pounds.

He has the wooden man lift the ball again, this time with his "back" muscles. The scales show a pull of 56 pounds, or seven times as much.

So far Bradley has shown the wooden man at safety meetings in Wyoming, West Texas and the Tulsa shops as well as in Missouri. He is scheduled to make appearances at all work locations.

In the meantime, Bradley has built up interest in "Samson" by printing a story about the man in *The Connecting Rod,* employe publication of Service Pipe Line. However, he didn't publish how much strain will be on the wooden man's back when he lifts incorrectly. He wants the men to keep guessing on that point.

That the wooden man is popular is shown by the length of the meetings where he appears. The demonstration is scheduled to last 20 minutes, but questions and answers have always run it well over that time. One meeting lasted an hour.

"One important thing about the wooden man," Bradley says, "is it tends to loosen the men up. They start asking questions and before they're done they've asked questions about safety that they ordinarily wouldn't ask."

Bradley doesn't plan to patent his idea. In the interest of safety he invites anyone who has a problem with back injuries to make themselves a wooden man. It has lessened his problems.

Four-Point Engine Control

■ CONTINUED FROM PAGE 228

engine to develop its peak horsepower. Compression and peak pressures together with horsepower should be balanced between cylinders. Goals for peak pressures and compression pressures are best determined during the tests. Maintain a low terminal pressure at the end of the exhaust stroke. Operate the engine with excess oxygen present in the exhaust gases. Above all, consider each cylinder as an individual engine. Set the ignition with a neon light in order to overcome the variations that may be present in spring tensions between magnetos. Be sure that the inlet and exhaust valve springs are strong enough to keep the valve train operating on the camshaft. If the spring is too weak the valve will tend to flutter or fail to follow the contour of the cam and increased valve and seat wear will result. Be sure the valves are seating properly and that they have proper running clearance.

In order to emphasize the points brought out in this article the figures denoting engine performance are presented and described.

Figure 1 through 4 each show a power card made with a 100 psi spring. Purpose of this indicator card is to enable the operator to compare indicated horsepower, ignition point, peak pressure and expansion lines. The piston travel and flywheel position have been scaled on the card.

The Figure also show a compression card made with a 50 psi spring. Purpose of this card is to enable the operator to compare compression pressures when the ignition has been shorted out.

The final card in each figure is the light spring or valve motion card made with a five psi spring. From this indicator card the operator can study the pressures within the power cylinder throughout that portion of the cycle during which the inlet and exhaust valve is open and for a short period of the compression stroke. These cards also have the flywheel and piston position scaled onto the card. They also contain pertinent data recorded at the time each set of cards were made.

Figure 1 was made with the inlet valve opening on 345 degrees. Figure 2 was made with the inlet valve opening on 350 degrees. Figure 3 was made with the inlet valve opening on 355 degrees. Figure 4 was made with the inlet valve opening on 0.

This month we'll ship our 31,470th mile of large diameter welded line pipe

This month we will have shipped 31,470 miles (4,612,495 tons) of A. O. Smith Line Pipe for the world's growing pipe line networks.

In the latter part of 1927, when A. O. Smith introduced its large diameter, high strength, welded line pipe, the entire industry could turn out no more than three miles of large diameter pipe per day. *By 1928,* A. O. Smith had increased its capacity to more than 15 miles per day.

Virtually overnight A. O. Smith opened the way for the construction of many contemplated lines which were not economically possible until an adequate and assured supply of pipe was available.

Since that time, by every means known to science, the SMITHWAY process of pipe manufacturing has been ceaselessly developed and perfected, offering ever greater assurance of accuracy, uniformity and reliability.

Today A. O. Smith is still the leader in the development and manufacture of large diameter line pipe and practically every major pipe line is wholly or partly built of our pipe.

DEPENDABILITY through RESEARCH and ENGINEERING

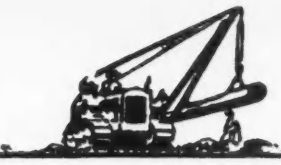
78th ANNIVERSARY 1874 1952

A.O.Smith

CASING • LINE PIPE

Chicago 4 • Dallas 2 • Denver 2 • Houston 2 • Los Angeles 22
Midland 5, Texas • New Orleans • New York 17 • Pittsburgh 19
San Francisco 4 • Seattle 1 • Tulsa 3 • Washington 6, D. C.
***International Division:* P. O. Box 2023, Milwaukee 1**

PIPE LINE *Construction*



Projects Announced and Contracts Awarded

Crude Lines

Creole Petroleum Corporation has awarded a contract to Williams Bros. Company, Tulsa, for the construction of 143 miles of 26-inch pipe line in Venezuela to run from the Ule station, on the east side of Lake Maracaibo, to the Amuay Bay terminal. Work is expected to get underway by the first of June. Creole also plans to lay 23 miles of 34-inch line from the Lagunillas field to the La Salina terminal on Lake Maracaibo.

Gulf Refining Company intends to build 80 miles of 24-inch crude line from Midland to the now building West Texas Gulf Pipe Line Company's system at Colorado City, West Texas. Steel for the line has been allotted for the second quarter of this year.

Interprovincial Pipe Line Company has awarded contract for installation of 100 miles of 16-inch loop lines on its Regina to Gretna, Manitoba, Canada, line. Anderson International Constructors, Ltd., Edmonton, intends to start the job about the first of June.

Service Pipe Line Company has PAD approval for construction of 26 miles of 10-inch line from the Saunders field, Lea Co. N. M., to Wasson station, Yoakum Co., W. Texas.

Product Lines

Plantation Pipe Line Company plans to hike the capacities of its three lateral lines in Georgia, Alabama, and Tennessee by constructing booster pump stations at selected locations. The stations will be automatic and operated by remote control from distant stations. In addition, plans call for expansion of the main line station at Gastonia, N. C.

Salt Lake Pipe Line Company has announced plans for construction of a 330-mile 8-inch products line from Salt Lake City to Boise, Utah. The new carrier will be built at a cost of $8 million and will parallel an existing pipe line. Construction will start within a few months if pipe is available, and is expected to be completed late in the year.

Sun Pipe Line Company will build a 110-mile 8-inch product line between Fostoria, near Toledo, and Hudson, near Akron, Ohio. Bids for the $3 million project will be requested on June 1. Completion is scheduled for Sept. 30.

Natural Gas Lines

Associated Natural Gas Company has asked FPC for permit to build 32 miles of pipe line to provide gas service to Jackson, Portageville, Gideon, Morley, Spoonerville, and Bernie.

Gulf Interstate Gas Company, a newly formed firm, has plans to build a 30-inch pipe line more than 1000 miles in length from the Texas or Louisiana coast to West Virginia. This $100 million system would serve only as carrier for United Fuel Gas Company's gas which would be delivered to them in W. Va. Initial capacity of the system would total 375 million cubic feet per day, which would ultimately be hiked to 525 million. This new company was formed by officials of Panhandle Eastern Pipe Line Company, and application for FPC permit is expected to be made in about 6 months.

Lone Star Gas Company has been authorized by FPC to construct 69.5 miles of 20-inch line from Garvin Co., Okla., to Petrolia, Clay Co., N. Texas. The project cost of $4,010,200 would include gathering lines and 3 dehydration plants.

Northern Natural Gas Company has asked FPC for authorization to build 400 miles of 24-inch gas line from Emerson, Manitoba, on the U. S.-Canada border, to the company's system near Minneapolis and St. Paul. Western Pipe Lines, a Canadian corporation, would supply the line with Alberta gas at the border if export permission is granted by the Provincial government. Two stations of 10,560-hp would give the line a daily capacity of 120 million cubic feet, and additional power would be added to boost daily throughput to 250 million.

Ohio Fuel Gas Company has petitioned FPC for permit to lay 33 miles of 20-inch line from Jefferson Township, Crawford Co., to Seneca Township, Ohio. This line would replace existing 8- and 10-inch lines, and would cost $1.4 million. Ohio Fuel also asked for permission to replace 7.9 miles of 16-inch with 20-inch in Wood Co., Ohio.

Pacific Northwest Pipeline Corporation has amended its proposal to FPC for a permit to build a line into the Pacific Northwest markets. The company now proposes to build about 828 miles of main lines, spurs, and laterals from the U. S.-Canadian border in Stevens Co., Wash., through Wash. and Ore., and transport Canadian gas furnished by Prairie Transmission Lines, Ltd. In addition, a comparable amount would be purchased in Michigan from Panhandle Eastern for return to Canada's eastern markets. Originally the proposal called for 2175 miles of line from Texas to the Northwest Pacific states.

Permian Basin Pipeline Company has requested FPC to issue certificate for a 384-mile 20- thru 30-inch system from Upton Co., W. Texas to Northern Natural's system in Carson Co., Texas Panhandle. The line would follow a route through Lea and Roosevelt counties before terminating in the Panhandle. Four stations with an aggregate of 74,360-hp would give the system a daily capacity of 200 million cubic feet for first year and 300 million thereafter.

South Georgia Natural Gas Company has made application to FPC for permit to lay 339 miles of 2- thru 12-inch line from Southern Natural's line in Lee Co., Ala., to near Albany, Ga. From that point the line would reduce in size and continue to Tallahassee, Fla. Daily capacity would total 45 million cubic feet.

Westcoast Transmission Company, Inc. has made application to FPC for authorization to build 349 miles of pipe line from Westcoast Transmission Co., Ltd's. line at U. S.-Canadian border near Sumas, Wash., to Portland, Ore.

Projects Started

Crude Lines

Interstate Oil Pipe Line Company has started 32 miles of 20-inch line between its Bunkie station, Avoyelles Parish, to Melville station, St. Landry Parish, Louisiana. Latex Construction Company of Georgia, Atlanta, has the contract. This line will replace multiple 8- and double 12-inch lines now in use.

Platte Pipe Line Company had Fulton and Brodie, Amarillo, (joint venture) start 142 miles of 20-inch between Holdrege and Odell, Neb. This is section of 1078-mile system from Wyoming to Illinois. Other contractors on the job are: O. R. Burden Construction Co., Tulsa; Rumsey Brothers Pipe Line Construction Co., Wichita; and R. H. Fulton & Co., Lubbock.

Sinclair Pipe Line Company had R. H. Fulton & Company start 180 miles of 24-inch line between Humboldt, Kans., and Salisbury, Mo. This is section of 675-mile Drumright, Okla., to East Chicago system.

Texas Pipe Line Company has Houston Contracting Company, Houston, at work on approximately 220 miles of 22-inch line from Houma, La., to Port Arthur, Tex. Same contractor has started 95 miles of 6-, 8-, 10-, and 12-inch lines in Southern La., for the same company.

Cities Service Pipe Line Company started 20 miles of 8-inch loop lines between Cushing and Coyle, Okla. Cragg Contruction Company, Okla. City, has the contract.

Natural Gas Lines

Southern Union Gas Company started 21 miles of 20-inch from Farmington to Albuquerque, N. M., and 25 miles of 4- thru 8-inch gathering system in San Juan Co., N. M. Foutz and Bursum Construction Co., Farmington, is doing the entire project.

United Cities Utilities started work on 31 miles of 4-inch line from Transcontinental Gas' system to Gainesville, Ga. Construction is being done by M. L. Hulcher, Inc., Virden, Ill.

Projects Completed

Crude Line

Ohio Oil Company has completed the Sheridan, Ind., to Lima, Ohio, section of its 343-mile 20- and 22-inch carrier. The section was 117 miles long and was done by Conyes Construction Co., San Pablo, Cal.

Union Oil Company has completed a pump station in the Blackwells Corner field, Kern Co., Cal. Engineers Limited Pipeline Co., San Francisco, built the station.

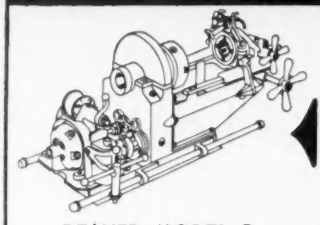
Natural Gas Lines

American Republics Corporation completed 30 miles of 6-inch line in the Silsbee-Kountz area, E. Texas. James S. Stewart Contracting Co., Houston, was the contractor.

Oklahoma Natural Gas Company finished 22 miles of 24-inch from Depew storage field to Kellyville, Okla., with Trojan Construction Co. Inc., Okla. City, laying the pipe.

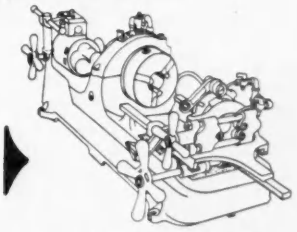
"Lowering-in
30" pipe line
in Texas"
HOUSTON CONTRACTING COMPANY
General Contractors
OIL • GAS • GASOLINE • WATER PIPE LINES
LAURENCE H. FAVROT R. P. GREGORY GEO. A. PETERKIN
2707 FERNDALE PLACE HOUSTON 6, TEXAS

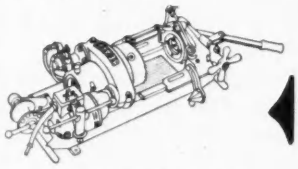
BEAVER—gives you a choice of 4 PIPE and BOLT MACHINES



BEAVER MODEL-A
A rugged, Heavy-Duty Machine. Range ⅛ to 2". Up to 12" with Geared Tools and Drive Shaft. Bolts ¼ to 2"—Weight 365 lbs.

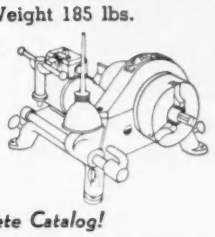
BEAVER MODEL-B
A Middleweight Utility Machine. Range ⅛ to 2". Up to 8" with Geared Tools and Drive Shaft. Bolts ¼ to 1½"—Weight 235 lbs.





BEAVER MODEL-E
A Lightweight Portable Machine. Range ⅛ to 2". Up to 8" with Geared Tools and Drive Shaft. Bolts ¼ to 1½"—Weight 185 lbs.

BEAVER MODEL-CI
A sturdy little Power Drive that converts Hand Tools into Power Tools—Range ⅛ to 2". Up to 8" with Geared Tools and Drive Shaft. Bolts ¼ to 1½"—Weight 140 lbs.



Write for NEW Complete Catalog!

BEAVER PIPE TOOLS, 254-300 DANA AVE., WARREN, OHIO

...you'll feel the years take wing!

... as you take the relaxing, revitalizing therapeutic mineral baths and soothing, stimulating massage.

MINERAL WELLS, Texas

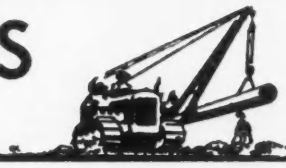
BAKER HOTEL
and Baths
HOME OF THE FAMOUS BRAZOS CLUB

Unsurpassed facilities for rejuvenation and recreation ... luxurious accommodations ... beautiful grounds ... all outdoor activities.

Listed by Advisory Committee on American Health Resorts of the American Medical Association

How to do it!

PIPE LINE HINTS

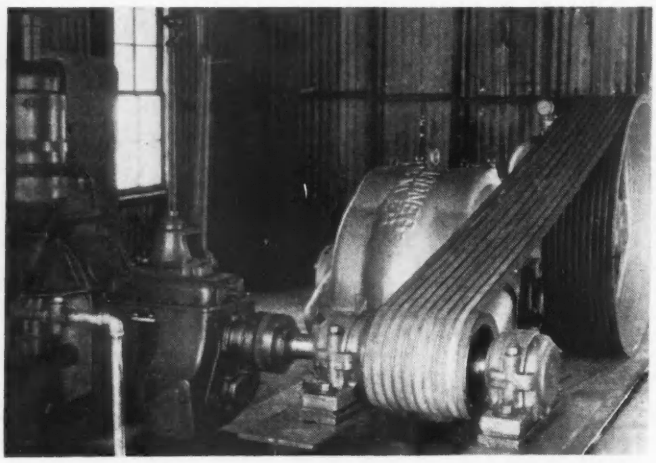


$10 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas

Adding Gears to Pump Lowers Operating Costs

Adding a gear shift to a pipe line pump enabled one company to substitute a 40-horsepower engine for the existing 90-hp pump engine thereby lowering operating and maintenance costs at a small pump station.

This reciprocating pump, tied to 10½ miles of 4-inch feeder line, was operated at intermittent intervals. Starting the oil to flow caused the 90-hp engine to labor and the clutch to slip, even in summer. In the cold winter months, these conditions were worsened, and the discharge pressure often would reach 550 pounds per square inch before dropping back to the normal 200 pounds operating pressure that was required to move 200 barrels per hour down the line. Clutches had to be changed frequently.



A careful study of the problem revealed that only 30 horsepower was required to maintain the 200 barrels per hour flow rate, and that 90 horsepower was required only in starting the flow.

With this in mind, the company replaced the 90 hp engine with a 40 hp engine, using a gear box to couple it to the pump.

Now, in order to start flow down the line, the pump is placed in low gear and the oil starts flowing slowly down the line. When the discharge pressure drops back to normal, the gears are shifted into high and oil is moved at the rate of 200 barrels per hour.

Small Unit Samples Gas on Individual Leases

A miniature dehydration plant is the means of sampling product content of gas feeding into a central dehydration unit, providing a basis for payment for small amounts of condensate carried in the gas to lease holders without need for individual separation units and tankage.

The small dehydration unit can be mounted directly on the meter run as shown. U-bolts at the bottom of the angle iron frame tightened around the pipe hold the unit in place. The unit can be used for running tests of almost any length.

A simple re-arrangement of piping is necessary before the test plant can be used on a line. A bypass, made by extending the meter run an additional 14 feet and installing high pressure block valves, is necessary. Side valves on either side of the block valve can be used to supply gas for the tests.

In making the tests, the block valve in the line is closed. Gas flows through the upstream valve and piping to the unit. Piping to the downstream valve comes from the unit.

When the block valve is closed, all gas flowing in the line can be directed through the plant.

Gas from each lease can be tested for condensate content, and the various lease holders paid on basis of gas sales and estimated condensate content.

Weld Cleaner Made Of Hack Saw Blade

An excellent tool for cleaning welds can be made from a hack saw blade and a short length of ¾-inch pipe.

The hack saw blade is cut in half and fitted into a handle made from the pipe nipple. The handle is made by flattening one end of the pipe so that the hack saw blade fits snugly inside the pipe.

A set screw is made from a stove bolt and nut. A hole is drilled in the flattened end of the ¾-inch nipple and the nut is brazed onto the pipe over the hole, which must be larger than the bolt size. A piece of heavy wire or nail brazed onto the stove bolt permits the set screw to be tightened.

Also shown are the other tools of the trade: an ice pick for cleaning out pin holes, and a wire brush to clean off wide areas before the hack-saw treatment is applied to the small crevices.

Almost all pipe line welds are subjected to X-ray examination, which provides a means of judging the amount of slag left in the weld metal. It is important that the weld be cleaned thoroughly after each pass. The hack saw blade mounted in the pipe handle is an effective tool, especially in cleaning slag out of undercuts. The rough blade is also effective in breaking the wide coat of solidified slag from the pipe.

IT'S FAST... IT'S NEW...

another CATAWISSA FIRST!

NEW SPEED FOR PIPING INSTALLATIONS

280% FASTER OPENING AND CLOSING

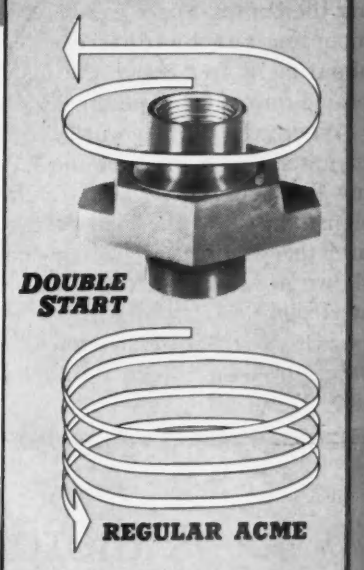
CATAWISSA DOUBLE START PERFECT SEAL UNIONS

WILL NOT LOOSEN UNDER VIBRATION

1¼ TURNS OF THE NUT TO MAKE UP!

instead of 3½ turns of regular nut threads

ACME THREAD



2 START POSITIONS

NOW YOU CAN HAVE THE NEW SPEED OF DOUBLE-START THREADS IN ANY 2" TO 4" ACME THREAD CATAWISSA PERFECT SEAL UNION!

PERFECT SEAL SEATS

Catawissa now offers you the PLUS FEATURE of 280% faster nut opening and closing for all piping installations where you use Acme thread unions!

Customary fumbling for starting thread is virtually eliminated—Catawissa DOUBLE-START UNIONS have TWO Acme thread starting positions (instead of one) with the same holding qualities, the same ability to hold tight under vibration as regular Acme thread unions—the threads are Acme, the thread form is the same.

See them at your favorite supply store, place your order now—just specify DOUBLE-START THREADS on any 2" to 4" Acme thread Catawissa PERFECT SEAL UNION of the lug or hex nut type! (Smaller sizes on special order).

NO LOSS IN HOLDING QUALITIES

SEE OUR CATALOG IN THE COMPOSITE CATALOG

WRITE FOR DATA SHEET D-S-1

CATAWISSA VALVE & FITTINGS CO.

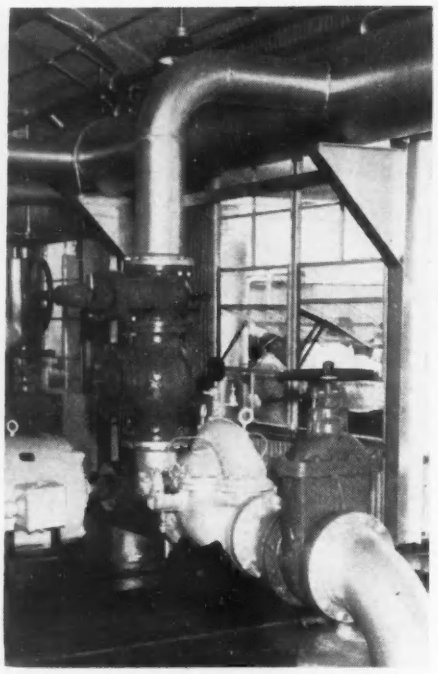
60 MILL STREET ★ CATAWISSA, PENNA.

Brackets for Water Header Save Space

Supporting one of the cooling water headers on brackets welded to columns in the auxiliary building saves floor space.

Most water headers are run underground with risers coming through the pump building wall about two feet above the floor. This practice effectively blocks part of the floor space in the building, creating a difficulty in maintaining the building and servicing the pumps. Space can be saved by mounting the headers on the wall about eight feet above the floor and piping down to the pumps.

Where the cooling water header is mounted above the floor the supporting brackets should be carefully designed to carry the load of the pipe and the water as well. The brackets shown are made of triangular shaped steel plate outlined with steel strap making a structural section of great strength. U-bolts made from mild steel



bar threaded at both ends hold the header in place.

Since the piping leaves the building at right angles, part of the weight of valves and piping is supported by the rigid header.

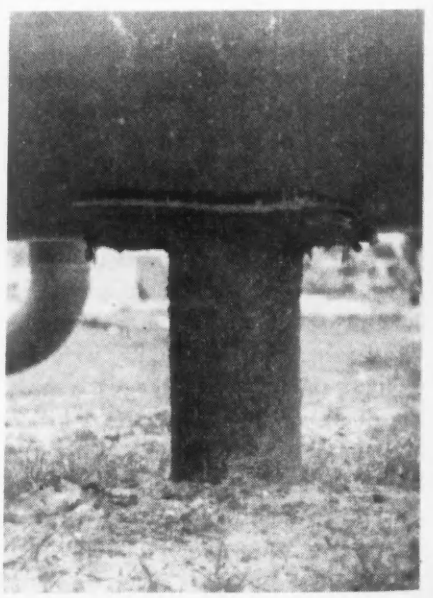
Inexpensive Asphalt Pad Can Cut Costs

A few cents' worth of asphalt impregnated asbestos felt placed between meter run or manifold and pipe support can save a great deal of money by reducing corrosion.

A local rusting or corrosion takes place between the pipe and the metal saddle of the support. The cause can be traced to moisture trapped in the space between pipe and saddle, causing an electrolytic oxygen concentration cell. Also there is possibly a certain amount of fretting corrosion caused by metal pipe rubbing against the metal support as the pipe contracts and expands with temperature changes.

The corrosion can be stopped by placing a quarter-inch pad of asphalt impregnated felt between the saddle of the support and the pipe. This permits the pipe to move freely over the mastic and prevents moisture collection between pipe and saddle.

The advantage of this pad was demonstrated at a gas pipe line terminal. One meter-run was supported by a naked pipe support, while others were insulated with the felt. After several months, paint at the non-insulated support was discolored and corrosion had set in; there was no evident of corrosion at the insulated supports.



A thorough analysis of the complicated problem: *ownership of pipe lines.*

AMERICAN PIPE LINES

Their Industrial Structure, Economic Status, and Legal Implications.

By GEORGE S. WOLBERT, Jr.

● Increased concentration of the ownership of pipe lines has created dissension within the oil industry which has resulted in legal suits involving federal legislation. This book is a thorough and scholarly effort to present and analyze the salient factors involved.

Part I discusses the historical, economic, and factual development of pipe lines, including specific issues relating to industry rate and service requirements. Part II surveys existing legal and administrative remedies designed to cope with the problems of the industry. Decisions of the Interstate Commerce Commission as they affect rates and services are examined fully.

Economists, lawyers, legislators, and members of the industry will find much help in this book.

Send for your copy today.
$3.50 postpaid. Order from
UNIVERSITY OF OKLAHOMA PRESS
Dept. AM6, Norman, Oklahoma

You get a GREEN LIGHT all the way

with Quality Controlled PITT CHEM Plasticized Enamel

AS a basic producer of quality-controlled pipeline enamels, Pittsburgh Coke & Chemical keeps you rolling down the line with deliveries as scheduled. *We have never failed to meet a delivery promise!*

What's more, you'll cover more miles per day with Pitt Chem Enamels. Pitt Chem Plasticized grade, for example, heats up faster, flows better from kettle to pipe and coats more pipe per ton because of its consistent top quality and uniform application characteristics.

As a basic and integrated producer, we control every phase of production from coal to finished product—in a plant devoted *exclusively* to coal tar coatings. ● We're always ready to help you do a better and faster pipeline coating job. We'll gladly send technical data—or provide you with field application assistance when needed.

★ Standard Grade Tar Base Enamel
★ Modified Grade Tar Base Enamel
★ Plasticized Grade Tar Base Enamel
★ Cold Applied Tar Base Coatings

PROTECTIVE COATINGS DIVISION

P C&C C

PITTSBURGH COKE & CHEMICAL CO.

Grant Building · Pittsburgh 19, Pa.

WBD 4166

COAL CHEMICALS • AGRICULTURAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

PIPELINE COMPLETION "DEADLINES?"

Pipelines are not Sidelines...

WITH -

WILLIAMS BROTHERS

TULSA NEW YORK
ATLANTA LOUISVILLE

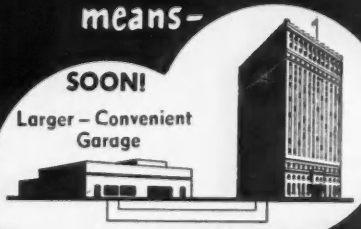
Caracas • Maracaibo • Bogota • La Paz

ENGINEERS-CONTRACTORS

Oil—Gas—Products—Water
Pipelines and Pumping Stations

Business and Pleasure in TULSA means-

SOON!
Larger – Convenient Garage



THE MAYO

★ CENTRALLY LOCATED
★ AIR CONDITIONED ★ COFFEE SHOP

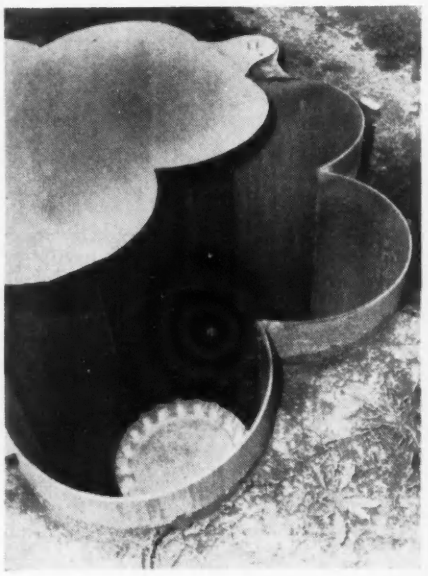
PIPE LINE HINTS

Valve Box Made From Scrap Pipe

Scrap line pipe, cut in half sections and welded together in a clover-leaf shape, makes an inexpensive valve box.

Conventional concrete boxes are expensive and time consuming to form and pour. At remote locations, lack of concrete mixing equipment and materials adds to cost. Yet by the time most pipe line projects are finished, there is an ample supply of short pup joints of big-inch line pipe left in the scrap pile. These can be efficiently utilized to form valve boxes.

To make the box cut pup joints of big-inch pipe into halves and weld them together from the inside out as shown. Cut the joints long enough to reach from desired depth to an elevation about six inches above grade. After the clover leaf section has been welded together, make the lid by outlining the shape of the box in light gauge plate steel. Weld two or three clips to the top of the box for bolting or locking the top in place.



After the box is completed, apply prime coat and enamel to the box before placing it over the valves.

There's nothing like a VOSS VALVE

to make good compressors operate better

to make worn compressors operate like new!

It is a matter of record that every time an ordinary compressor valve is replaced with a specially designed VOSS valve, the immediate result is increased efficiency and greater output . . . and this record covers thousands of installations.

VOSS VALVES are made to specifications for all types of air, gas and ammonia compressors; from 1" to 16" in diameter and for pressures from minus 27HG to 7,500 pounds and for speeds up to 1,000 rpm and above.

VOSS VALVES are machined from solid stock (not cast)—PLATES are machined and ground (not press formed) for precise high-tolerance fit; VALVES and PLATES are of heat-treated alloy and stainless steel; the PLATES are dimensionally stable, ductile, resist fracture, high temperatures and corrosion; withstand fatigue; won't chip, crack or score cylinder walls.

Don't be fooled by similarity in appearance. Be sure your replacement valves and plates are marked "VOSS" and obtain the VOSS values developed by 32 years of specialized compressor valve engineering and experience.

VOSS VALVES and PLATES ASSURE

- Quiet, vibration-free operation
- 20 to 60% more valve area
- Less power consumption
- Low Pressure loss
- Normal discharge temperature
- Lower operating costs

To increase the efficiency of your compressor, send us the name, bore, stroke and speed of your machine. Our detailed proposal will be sent without obligation.

J. H. H. VOSS VALVES
REG. U.S. PAT. OFF.

J. H. H. VOSS CO.
INCORPORATED

783-B East 144th Street, New York 54, N. Y.

More German Crude

AG Helmsand 1 was the first deep offshore test in Germany. It was abandoned in October, 1951, at approximately 7550 feet.

Domestic Production Soars to 9,656,000 Barrels in Effort To Hike Fuels Supply and Cut Foreign Currency Commitments

By ALFRED M. STAHMER

PROMPTED by acute need, Germany's oil industry is curving its annual production steadily upward toward the 14-million-barrel goal set two years ago. This goal, written into the nation's hope chest by the Wirtschaftsverband Erdoelgewinning (oil producers association), is aimed at increasing Germany's industrial fuels supply and lessening foreign currency commitments.

Recently-tabulated preliminary figures for 1951 show record-breaking production for the year of 9,656,000 barrels and a footage-drilled mark of more than 1,300,000 feet. The crude yield amounts to a 22 percent gain compared with 1950 production.

The complicated nature of Western European geology and relatively small areas of marine sedimentation leaves little hope that deposits of the Caribbean or Middle East type will be discovered. However, in the light of a permanent dollar shortage, indigenous sources are of great importance to Germany as well as all nations dependent to any extent on Marshall Plan aid. In the past two years, the Federal Republic of Western Germany covered almost a third of its national oil demand by domestic production. Since current home consumption is gaining, the proportion now is smaller.

Germany has leaned heavily on geophysical research in reaching its present stage of efficiency. Research activities are now principally concentrated on reflection seismic study carried out with modern American

Multiple pumping wells in the moor area of Ruehlertwist field

and German outfits, instead of torsion balance and refraction methods of recent years. About 30 crews were in the field during 1951, principally in Northwestern Germany, Upper Rhine Valley and the Forealps area. Several new structures were discovered.

Although the 1951 drilling goal was set at 438 deep wells and a total footage of 1,605,724 feet, the plan could not be fulfilled. Total 1951 footage was approximately 1,300,000 feet, of which wildcats accounted for 360,000 feet, extension wells 164,000 feet and producing wells 787,000 feet. In 1950, slightly more than 100 deep drilling rigs completed 407 wells in Western Germany, of which 267 found oil. Footage for 1950 was reported at 1,255,935 feet.

Wildcatting results in 1951 were not as outstanding as in 1949, when such relatively rich deposits as Ruehlermoor, Ruehlertwist, Suderbruch, Eldingen and Scheerhorn were found, however, two oil fields—Hohne and Hemmelte-West—and three gas discoveries—Frenswegen, Itterbeck and Rheden—were brought in. A fourth gas field, Wolfskehlen, may develop into a producer.

Hanover Exploration

Neglected areas between the Hanoverian salt domes came in for wide geophysical research, based upon the promising discoveries of Suderbruch and Eldingen two years earlier. While deep wells drilled to the north and northwest of the new Eldingen field near Bokel, Unterluess and Bodenteich have yielded no positive results, Deutsche Erdoel-AG. successfully completed a wildcat, Hohne 1, situated south of Eldingen and 12 miles east of Celle town in January, 1951. Angulaten sandstone of the Liassic alpha, the Eldingen pay, was encountered at 5759-5782 feet. The well initially flowed 353 barrels of light crude daily. In May, Well 4, situated 820 feet west of the discovery, yielded 734 barrels daily through a 12/16-inch choke. To maintain reservoir pressure, a 1/64-inch choke was installed later.

In August extension well Hohne 6 proved the Raetic underlying the Liassic was oilbearing. First producer from this horizon in the area northeast of Celle, Hohne 6 delivered about 140 barrels a day. The field, which is crossed by several faults, yielded 21,130 barrels in December with further drilling.

The year's outstanding development in Hanover province occurred at Suderbruch in June on a joint concession of Deutsche Vacuum Oel AG. (Socony-Vacuum Oil Company) and Gewerkschaft Brigitta (Shell Oil Company and Esso Standard Oil Company), with the discovery of a third pay in the Gigas beds of the Upper Jurassic. Suderbruch yielded 82,400 barrels in December, 1951, with indication that production can be increased even further. Modern drilling equipment and drilling practices are employed at Suderbruch, where the main pay, Cornbrash sandstone of the Jurassic, lies at a depth of about 6560 feet.

When heavy oil with a low pour point was found near Quakenbrueck in 1950, exploration was encouraged. Some oil even heavier than Quakenbrueck crude was encountered in wildcat wells of Wintershall AG. at St. Huelfe and Rheden. Gewerkschaft Brigitta found oil traces in its well Diepholz 2 in the Upper Jurassic formation.

While economical value of these discoveries is still uncertain, a striking find was reported at the end of November in the wildcat Hemmelte-West 1 on a joint concession of Gewerkschaft Brigitta and Deutsche Vacuum Oel AG. about 15 miles northwest of Quakenbrueck. From the Gigas and Kimmeridge beds of the Upper Jurassic at a depth of 3998-4067 feet, the hole erupted initially 1½ cubic feet of light crude daily through a 10/64-inch choke. A second well 1800 feet south came in

Rigging up begins on new location with erection of a 98-foot portable derrick

at a depth of 4346 feet flowing at the same rate.

Although Hemmelte-West discovery confirmed existence of oil in the Gigas and Kimmeridge beds in Western Niedersachsen province, exploration well Rheden 4 of Wintershall AG., situated near Diepholz, drew geologists' interest by encountering natural gas under high pressure in the Bunt-sandstone formation at 5790 feet. Previously, natural gas from Zechstein beds was found only in the Emsland district.

Because Rheden 4 originally was scheduled for only shallow work and had a diameter too small to handle normal output, Wintershall started a new well, Rheden 5, which was scheduled for completion in 1952.

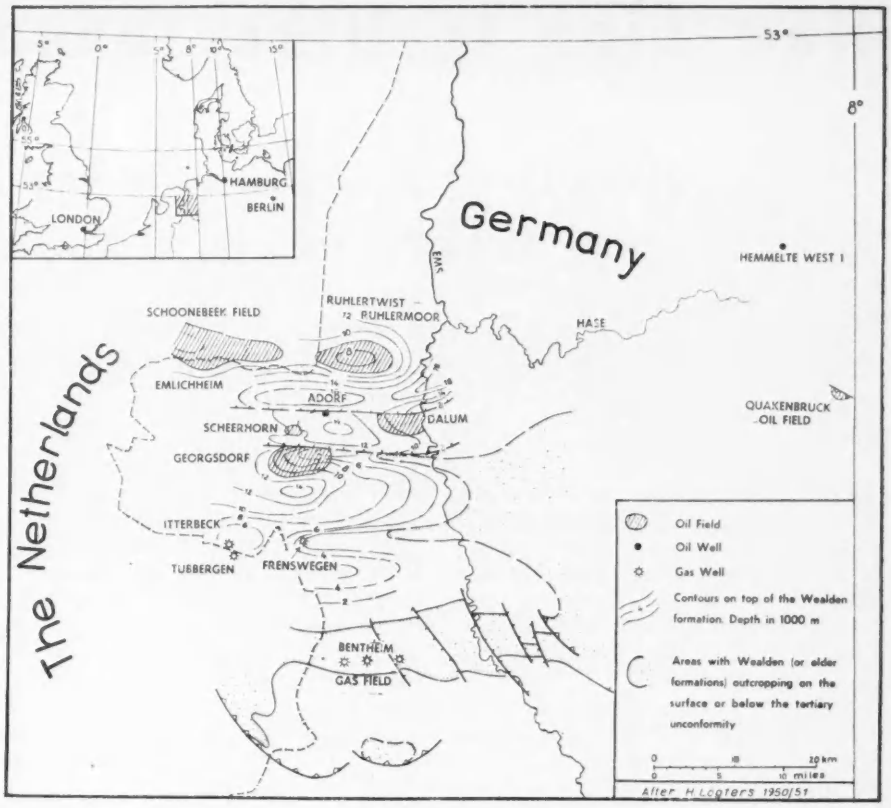
2 New Gas Fields

The year 1951 brought two new discoveries of gas deposits near the Dutch border in Emsland district. On the Dutch side, Nederlandse Aardolie Maatschappij completed successful gas wells. Early in the year, C. Deilmann encountered Zechstein gas in the well Itterbeck-Halle 1, on one of the joint concession areas of the Emsland-Viererkonsortium (C. Deilmann-Gewerkschaft Elwerath-Preussag-Winstershall). However, the hole was a technical failure.

In June the well Frenswegen 1 of Wintershall AG., situated near the Dutch border on a joint concession similar to Itterbeck, struck gas at 6314 feet in the same bed, plate dolomite of the Zechstein, the Emsland pay. Gas is now being sold to a textile mill in the town of Nordhorn to which about 2100 cubic feet daily are being delivered through a newly-built pipe line 2½ miles long.

Development of the promising Ruehlermoor-Ruehlertwist field group progressed during 1951, when total production rose to 1,160,800 barrels from 292,700 barrels in 1950. Well RM 30 in Ruehlermoor resulted in a considerable extension of the field in a southeasterly direction. Successful extensions were drilled in Lingen-Dalum and Georgsdorf fields. In Lingen, well L 56, among others, found oil in the Gigas beds of the Jurassic, adding a new pay to the producing horizons. The well flowed 212 barrels daily through a 12/64-inch choke. Both Ruehlermoor and Ruehlertwist are bound to an anticline structure about five miles long, and in Ruehlertwist, in a moor area, four to six directional wells are drilled from a single platform.

In August, Well 231 in the middle-western part of Georgsdorf field yielded an initial flow of .88 cubic feet of heavy oil daily from the Wealden (Lower Cretaceous) underlying the hitherto single pay horizon of the Valendis (Bentheim sandstone). Earlier Wealden tests in the extreme east and west sectors of the field indicated this horizon was either undeveloped or water bearing.



Principal German Fields

Offshore Drilling

In the Holstein-Hamburg district, exploration activities in 1951 were largely confined to the western flank of the Heide-Meldorf structure, where oil has long been produced by Deutsche Erdoel-AG. Helmsand 1, first German deep well outside North Sea coast dikes, was begun at the end of June to test the Rhaetic horizon in which the well Meldorf 92 had encountered oil traces previously.

Helmsand derrick was erected on a steel platform, high enough to protect equipment against high water. By end of October, the well had reached about 7550 feet. Several good—but dry—porous sandstone layers were found. The well was abandoned.

In two other exploration wells on the western flank of Heide structure, Hohenwoehrden 1 and 2, good reservoir beds were found in the Rhaetic, Lower Cretaceous and Jurassic formations. Further exploration will determine whether oil exists in these sands and sandstones in a higher structural position.

Rhine Valley

Discovery of gas at Wolfskehlen 1 exploration well of the Gewerkschaft Elwerath, near Darmstadt in Southwestern Germany, has stimulated exploration in the Rhine valley. The well blew out on August 3 at 2950 feet and was brought under control six days later.

Wolfskehlen 2 was drilled near its predecessor and completed at 5149 feet in the Rotliegendes, but no oil was found. Production test on the gas horizon, Hydrobien beds, was scheduled.

In Southern Wuerttemberg, north of Lake Constance, Saulgau 1, situated on a joint concession of the Deutsche Schachtbau and Gwerkschaft Elwerath was completed. A test of the oil-impregnated Suesswasser-Molasse revealed no commercial quantities. Wildcatting in the Alps Foreland from the Austrian to French and Swiss borders, supported by comprehensive seismic research, was scheduled to be continued in 1952.

At the beginning of 1951, total German underground reserves were estimated by Amt fuer Bodenforschung (*Geological Survey*) at 194,342,500 barrels proven and 74,203,500 barrels probable for a total of 268,546,000 barrels. Of that amount, 9,653,500 barrels were produced in 1951. However, with the new discoveries of Hohne and Hemmelte and extensions reached in Suderbruch, Georgsdorf, Lingen, Ruehlermoor and other fields, a new estimate is expected to exceed that figure.

New Line to Hike Indonesia Output

17-Mile, 12-Inch Sumatra Project to Allow Crude Production of Near 200,000 Barrels Daily in Midst of Political Unrest

By ROBERT E. SPANN, WORLD OIL Staff

RAPIDLY rising crude production of the Republic of Indonesia will be given a substantial boost of about 40,000 barrels daily to a total of near 200,000 barrels a day with the start of pipe line movement of crude oil early this month from the Minas field of Central Sumatra.

This 12-inch line extends 17 miles from the field to a barge terminal on the Siak River from where it will be transported down river to a deep-water marine terminal recently completed at Perawang near the mouth of the river and the Strait of Malacca. It is the first crude outlet from the Minas field, discovered in 1944 by Caltex Pacific Petroleum Maatschappij after an exploratory campaign in Central Sumatra dating back to 1935. At the end of 1951, Caltex Pacific had completed 27 oil wells in the field, 18 of which were drilled last year and the remainder in 1950. Internal political conditions prevented the company from developing the field between its discovery and early 1950.

While only the Minas field, the largest in Central Sumatra, will have a pipe line outlet, Caltex Pacific has two other proven small fields in this area of Indonesia: the Duri, about 40 miles northwest of Minas, and Sebanga, some 25 miles northwest of Minas. These fields, discovered in 1941 and 1940 respectively, have been inactive since. Until the outlet from the Minas field, the only producer in Central Sumatra was N. V. Standard-Vacuum Petroleum Maatschappij's Lirik-Ukui field, a 1941 discovery. This field has one flowing well with daily average production of 44 barrels.

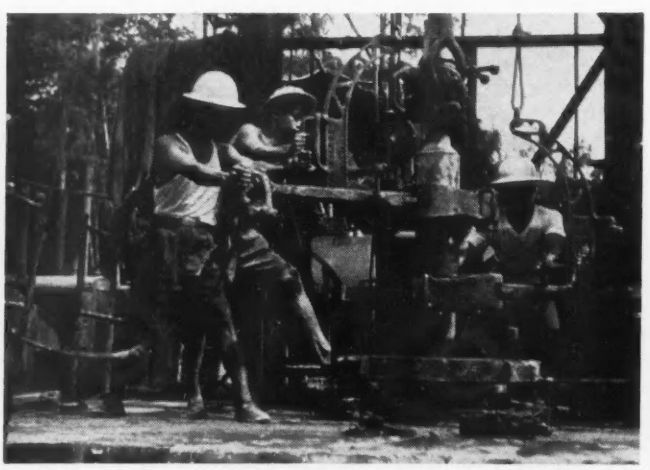
Caltex Pacific, which largely has limited its operations to Central Sumatra, also indicated a new discovery last year at Pungut, 25 miles north of the Minas field, with completion of two wells on a small structure. Standard-Vacuum Oil Company drilled one exploratory test, Kaula 1, in Central Sumatra, completed in November at a depth of 2900 feet as a dry hole. Four producers also were completed on Stanvac's Lirik-Ukui field.

Standard-Vacuum in South Sumatra completed 45 field wells, 42 of which were producers, for a total of 151,100 feet, and, including the Central Sumatra test, drilled 10 wildcats. Of the latter, three were oil producers, one a gasser and six were dry. The company discovered two new fields in South Sumatra, the Deras and Abad. At the end of the year Deras was producing 23 barrels daily from two flowing wells, and Abad had three flowing producers with a total daily average of 636 barrels. N. V. de Bataafsche Petroleum Maatschappij (Royal Dutch Shell) drilled at least five wildcats in Indonesia during the year.

While internal political complications in Indonesia during its transition from Dutch rule to a republic and in subsequent years, due to political disagreement among government leaders, have hampered operations of the three concessionaire companies, crude oil production has mounted steadily in the postwar years and last year jumped 5.1 million barrels over 1950 to a total of 55,309,545 barrels, or a daily average of 151,533. Postwar production has not reached the peak of 62,087,000 barrels in 1939, but the volume last year was more than 26 times greater than the 1946 low. Of 1951 Indonesian production, the Shell Group subsidiary accounted for 79,420 barrels daily and Standard-Vacuum's production amounted to 72,113 barrels daily.

Some uncertainties continue to exist in Indonesia. Intense nationalism has dominated the politics of Indonesia following the formation of the republic in December, 1949. In April of 1951, a new government, politically left of center, took office following a 37-day crisis created by the resignation of the previous government. Early in April of this year a new government was created headed by Dr. Wilopo, a nationalist leader of the leftist leaning. The new government's platform differs little from its predecessors, standing primarily for a continuation of an independent foreign policy in the East-West struggle and demanding winning Western New Guinea (Netherlands New Guinea) from the Dutch.

In the latter area, Nederlandsche New Guinea Petroleum Maatschappij (40 percent Shell, 40 percent Stanvac and 20 percent Caltex) has daily average crude oil production of 4850 barrels. In Brunei and Sarawak, two British possessions adjacent to Indonesian Borneo, two other Shell subsidiaries have production of 102,000 barrels a day in the former and 1013 barrels daily in the latter.



Drilling scene at a Standard Oil Company of California well in Minas field of Central Sumatra.

you have BAKER packers and bridge plugs set on a wire line

by your choice of these service organizations...

BJ SERVICE, INC. • DOWELL INCORPORATED • LANE-WELLS COMPANY • McCULLOUGH TOOL COMPANY • PERFORATING GUNS ATLAS CORP. • SCHLUMBERGER WELL SURVEYING CORP. • WELEX JET SERVICES, INC. WELL PERFORATORS, INC. • THE WESTERN COMPANY

perforating operation and the wire line setting of a Baker Bridge Plug, or a Baker Production Packer can be performed from a *single set-up* by the wire line service organization you select, with definite *savings in time and money.*

Consider also, the advantages of accurate correlated measurements:

(a) wire line measurement while logging the well;

(b) wire line measurement for gun perforating; followed by

(c) wire line measurement for setting Baker Bridge Plugs or Baker Retainer Production Packers.

WHY NOT FIND OUT how you can save wear and tear on tubing (or drill pipe) with *wire line setting?*—Find out also how a Baker Production Packer set on a wire line for dual-zone production, saves almost one-half the cost of drilling two single-zone wells to the same two zones!—Why not get the facts as to how a Baker Bridge Plug provides a positive, leak-proof shut-off against any pressures—how it can be *set on a wire line in a few hours,* and drilled out more readily than any other bridge plug?

Ask Any Baker Representative
—wire, phone or write to any Baker Office for facts and specific recommendations.

BAKER OIL TOOLS, INC.

HOUSTON • LOS ANGELES • NEW YORK

...and in all active fields throughout the United States.

Petroleum for Power in Red Europe

Iron Curtain Parted to Reveal Industrial Revolution; 1954 Production of 94-115 Million Barrels Indicated

By JAN H. WSZELAKI

SINCE 1948-1949 an industrial revolution has taken place in the captive mid-European area now controlled by satellite governments of Soviet Russia. According to the long-range plans adopted by the governments of Eastern Germany, Czechoslovakia, Poland, Hungary, Roumania, Bulgaria and Albania, several thousand new, large and medium-sized industrial plants are being erected all over the captive area, while thousands of existing plants are being modernized, developed and extended.

A score or two of the new plants under construction, or still in the blueprint stage, may be described as huge even by American standards. A large part of this program—possibly half of it—had already been implemented by the end of 1951, with the result that the heavy industrial potential of the area has been doubled in comparison with that of 1938. The other half of the program remains to be fulfilled by the end of 1954 or the beginning of 1955 when the present five or six years' plans are expected to terminate in most of the captive area.

Pressure from Soviet

Under relentless pressure of the Soviet Union, satellite governments are doing their utmost to fulfill and overfulfill the prescribed program, if possible ahead of schedule. The issue of the armament race between the West and the Soviet Empire depends largly on success or failure of the industrial development of captive Europe.

The feasibility of this huge program depends, in turn, on the fuel and power at the disposal of the satellite governments at present and during the next few years. The captive area cannot count upon any large-scale importation of fuel and power from outside—with small local exceptions—and must produce enough not only to cover all its own present and future requirements but also to export considerable amounts of oil and coal to Russia and Western Europe.

As the demand for fuel and power for industry, transportation and domestic use is fast increasing, the captive area must develop its supply of fuel and power at a correspondingly rapid rate. If it does not, long-range economic plans will not be fulfilled in time.

Coal Unlimited

The oil production of the captive area depends on factors which are difficult to assess. Reserves of coal—mid-Europe's basic source of energy—in the area are unlimited for all practical purposes, and new investments in coal and lignite mining, together with a propitiatory attitude toward labor, will always result in more coal being extracted. Production of oil is different: there is no guarantee that new investments will produce oil. On the eve of World War II, Polish oil fields were regarded as being gradually exhausted; between 1909 and 1938 their annual production fell from about 12.6 million barrels to 3.7 million barrels. Production of much richer Roumanian oil fields fell from a peak of 63.6 million barrels in 1936 to 39.1 million barrels in 1943, and the prevailing technical opinion was that they had passed their production peak.

The point of departure of the current long-range plans is that new oil fields in Albania, Czechoslovakia and Hungary (and Austria as well) can be developed almost at will, that exhaustion of the oil fields in Roumania and Poland can be halted and production can be stimulated. The satellite governments and the Soviet experts who manage most of the oil fields take for granted that they contain much untapped oil, and that it can and will be extracted. More effort than ever before is being expended in the search for new sources of oil and in full exploitation of the existing wells.

According to the Roumanian Five Year Plan, about 5 million feet of new drilling will be made in 1955, while in the top production year of 1936 new drilling only reached a million feet. According to the same plan, Roumania will manufacture most of its own oil field equipment and make the installations at its plants. Altogether, the equivalent of $860 million will be invested in the Roumanian oil industry in the course of current plans.

As noted above, oil production hitherto obtained does not seem to confirm such optimism, especially since in the summer of 1951 the situation in the Roumanian oil fields, as in the others, was complicated by the food crisis.

Production Increases

In 1939 the eastern and richer part of the Polish oil fields (Drohobycz and Boryslaw) was annexed by Soviet Russia. During World War II, Nazis brought up the Austrian output to 8.2 million barrels in 1944 and that of Hungary to more than 6.3 million barrels in 1943, but they were unable to increase or even to maintain the level of Roumanian production, whose

In 1950, satellite Europe's oil production, shown in the top on each country, totaled 66,808,000 barrels. Production of between 94 and 115 million barrels annually by the end of 1954 is the Communist goal. While individual estimates are not available for Hungary, Austria and Albania, the Roumanian and Polish yields for 1955 have been set at 74 million barrels and 2.9 million barrels respectively, as shown in the bottom figures. Czechoslavakia is expected to produce 2 million barrels in 1952.

war peak was reached in 1942 at 42 million barrels.

Roumanian oil fields and refineries at Ploesti and its vicinity were heavily bombed during the war, but the ensuing damage was speedily repaired. When the Soviet authorities took over Roumanian oil fields in the fall of 1944, they began by seizing much of the drilling and refinery equipment and moving it to Russia. Consequently, productivity of the Roumanian oil fields was drastically impaired. For the same reason, productivity of Hungarian and Austrian oil fields (all Austrian fields are in the Soviet zone) also declined sharply. The initial Soviet policy of indiscriminate plundering, however, was soon replaced by one of rebuilding all mid-European oil wells under Russian control—including Albania—and exploiting them to the utmost. Since then, except for the insignificant Czechoslovak and Polish oil fields, which are run by local governments, the really large captive fields have been operated by Soviet or mixed semi-Soviet companies.

This means that they are managed by Soviet specialists using Soviet methods of extraction, which the Russians regard as more progressive than those used in the West. A huge and ever-growing amount of money and energy is being invested in the extension of existing fields and the search for new ones. The Soviet idea seems to be that the foreign companies which operated the oil fields in the captive area in the past were only looking for immediate profits and never did the job properly and that there is bound to be more oil over Middle Europe.

Insofar as Roumania and Hungary are concerned, results of the Soviet efforts cannot be considered remarkable. Hungary's output remains stationary, while in Roumania, partly because of Russian haste and the harshness of their methods, there has been until the present time constant difficulties of every kind with machinery, organization and manpower—perhaps even some sabotage.

Best proof of this is that no statistics on oil production in absolute figures have been officially published in Roumania since 1947; had there been good reasons for boasting, the figures undoubtedly would have been made known. On the other hand, there is much evidence that the Russians have been more successful in Albania, and even more so in their zone of Austria.

The present rate of oil output in Roumania, and for that matter in most of the other captive or Soviet-controlled countries (there is no oil in the Soviet zone of Germany), is the subject of much speculation. The "Economic Survey of Europe in 1950," an official publication of the United Nations—bound as it is to accept the indices occasionally given by the satellite governments and to draw its conclusions from them—estimates that in 1950 Roumanian output of crude oil reached 39,622,100 barrels, Hungary (which lagged behind its plan for 1950) 4,197,050 barrels, Poland 1,333,260 barrels, and Czechoslovakia 339,100 barrels. Together with the Soviet zone of Austria, whose production the survey esti-

mated at 10,182,000 barrels, total output of the captive area should have reached 55,673,510 barrels—plus that of Albania for which the survey gave no figure.

According to other authoritative sources, the above-quoted figure on the Roumanian output reflects the nonfulfilled plans for the Roumanian government rather than the actual level of production. Competent Roumanian experts residing in the U. S. claim that the 1950 oil output in Roumania did not exceed 31.1 million or perhaps even 29.6 million barrels. On the other hand, it is possible the survey underestimated the output of oil. Thus, according to accredited American sources with access to much special information, the 1950 output of oil in the Soviet-controlled section of Europe was: Albania, 12,639,000 barrels; Austria, 15,253,000 barrels; Czechoslovakia, 1,865,000 barrels; Hungary, 3,739,000 barrels; Poland, 1,022,000 barrels; and Roumania, 32,290,000 barrels—a total of 66,808,000.

This total is larger than most of the other estimates because of the high figures for Austria and Czechoslovakia, and in particular because of the surprisingly high figure for Albania. It would be noted that the corresponding figure for the Soviet Union in 1950 is presumed to have been 273,464,000 barrels. If the above-quoted American estimate is exact, it would mean that the output of oil in the captive part of Europe amounts to as much as one-fourth that of Russia proper.

Whatever estimate is accepted for 1950, it may be assumed that the 1951 output of oil in captive Europe was somewhat larger. It is true that according to official admissions in 1951 oil production in Czechoslovakia and Hungary lagged behind the plan, but this does not necessarily mean it has fallen below the level of the preceding year. On the other hand, it is claimed that by the middle of 1951 Roumanian output was 19 percent greater than by the middle of 1950, and the Polish output in the third quarter of 1951 was 11 percent larger than that of the third quarter of 1950. Moreover, new oil fields were discovered recently in the Soviet zone of Austria at Schwardorf, south of the Danube, opening up, it is asserted, "fantastic possibilities" for the future.

It is not easy to have an accurate idea of how much oil should be extracted in the captive part of Europe in the light of the investments and other measures foreseen in the long-range economic plans. Current plans anticipate that in 1955 Roumania should produce 74 million barrels and Poland about 2.9 million barrels. Czechoslovakia plans to extract more than a million barrels in 1952, according to plans. The planned figure for Hungary has never been disclosed, and neither have been those for Austria and Albania, both of which produce oil for the Soviet Union. Yet it is certain that Soviet authorities operating the oil fields in the last three mentioned countries *must* have definite targets which they have to reach by the end of 1954, when most of the present long-range economic plans of the captive countries will, in fact, terminate. These targets, together with the three disclosed ones, may add up to any figure between 94 million barrels and 115 million barrels—an output depending on many unpredictable elements.

To any estimate for 1954 should be added the growing output of synthetic oil produced in the northern part of the captive area. The majority of the German synthetic plants, not all of them completed before the end of the last war, were situated in the present Soviet-controlled area. Out of the 32 German-built plants of this kind, 11 were in Soviet Eastern Germany, 1 in Bohemia and 5 in present-day Poland.

Synthetic oil-producing in "Greater" Germany during World War II rose to the rank of an enormous industry. In 1939 Germany produced slightly more than 14 million barrels of synthetic oil; at the end of 1943, despite increasingly heavy strafing from the air, this output increased to more than 42 million barrels, almost 80 percent of which was produced by the Bergius method. More than half, and possibly as much as three-quarters of that oil, was produced in the present captive area, mainly by the Leuna, Most and Pölitz plants.

Nearly all of these plants were heavily damaged during the last months of the war and some of them, like Pölitz, practically destroyed from the air. When the Russians moved into the present captive area in 1945, they dismantled all Polish and many German plants and sent their installations to Russia. The Most plant, taken intact, was declared war trophy and subsequently returned to the Czech government in exchange for the Jachymov uranium mines nearby. All remaining German plants were taken over by the Soviet "state trusts."

It is difficult to appraise the present capacity and production of the synthetic oil plants in the captive area since information on this type of production is a closely-guarded state secret. It is known, however, that the Leuna, Zeits, Böhlen, and one of the two Lützkendorf plants in Eastern Germany, as well as the Most plant in Bohemia and the Dwory plant in Poland, do produce synthetic oil on a much lesser scale than during the last war. Speaking on the subject in January, 1951, the Eastern German minister of heavy industry said he was proud of the "balance sheet" of this type of industry and its performance in 1950: the annual plan was overfulfilled by 16 percent, with particularly good results at Leuna and Lützkendorf; the former producing good automobile gasoline with a 68 octane rating, and the latter turbine and other oils.

The official long-range plans anticipate a Czech production of 3.6 million barrels of synthetic oil in 1953, and an Eastern German production of 6.4 million barrels of gasoline and 4.5 million barrels of diesel fuel by 1955. To these figures must be added the undisclosed output of the Polish plants. The latter will depend largely on the amount of steel the Warsaw government will be able to assign to the construction of Polish plants; it is known that coal hydrogenation installations require a tremendous amount of steel. It may be that the total plan for the production of synthetic oil by 1954-1955 exceeds 17.5 million barrels. In fact, it may well be that the Eastern German plan underestimates the production anticipated by 1955; while it is in the Soviet interest to exaggerate for prop-

About the Author

JAN WSZELAKI, a specialist in economic affairs, was a member of the Polish diplomatic service from 1918 to 1945. Prior to the last war, he was secretary and counselor with the rank of minister at the Polish embassies in London and Washington. A keen analyst of the industrial potential in the Russian satellite orbit, Wszelaki has drawn upon his background of knowledge and experience in Middle Europe to make an expert appraisal of the Russian-controlled European energy potential. His complete analysis of this potential was published this year in a 64-page study, entitled "Fuel and Power in Captive Middle Europe," by the Mid-European Studies Center of the National Committee for a Free Europe, Inc., 110 West 57th Street, New York.

WE MAPPED 500,000 ACRES TODAY... HOW'S YOUR EXPLORATION COMING ALONG?

Speedy Air Surveys deliver Photos and Maps at a Fraction of the Cost of Ground Surveys

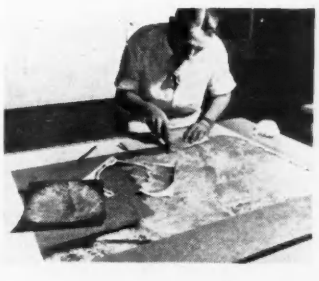
Before expensive ground studies begin, you can get a lot of reconnaissance facts from the air. Facts about surface geology and general trends, from detailed stereo-photos of your area. These same photos, carefully assembled in photo-mosaics, provide base maps for surface work.

How fast can you get photo-coverage? Very quickly. The mapping plane can cover half a million acres a day in routine reconnaissance. And AERO is equipped to undertake photo-mapping anywhere in the world.

How much will air surveys cost? Generally, very much less than ground surveys. The larger the area, the greater the saving.

In addition to air photo coverage, AERO executes reconnaissance surveys with the airborne magnetometer. Our precise surveys can provide significant data about regional trends and basement structures to guide your intensive ground studies.

Call on our million miles of world-wide exploration experience when you plan your next survey. Write us for a budget figure.



AERO
SERVICE CORPORATION
PHILADELPHIA 20, PENNSYLVANIA
Oldest Flying Corporation in the World

TOPOGRAPHIC MAPS • PLANIMETRIC MAPS
PRECISE AERIAL MOSAICS
AIRBORNE MAGNETOMETER SURVEYS
RELIEF MODELS • COLOR PHOTOGRAPHY

In Canada our affiliate is CANADIAN AERO SERVICE, LTD., *Ottawa*

aganda purposes achievements and targets for all naturally-produced sources of fuel and power in the captive area, the contrary may be true in respect to synthetic oil, if only for strategic purposes.

The captive area is capable of producing at least twice and perhaps even three times as much synthetic oil as projected in the long-range plans for its three northern countries. Even now the capacity of several large plants, in particular of Leuna and Most, exceeds by far the actual production. Production of synthetic oil demands huge quantities of electric power and hard fuel, and until such power and lignite or coal are available for this purpose, the extension or even full utilization of the present plant capacity would be of little practical use. Another factor is that the cost of producing synthetic oil is very high in comparison with the cost of natural petroleum; a gallon of synthetic gasoline produced at the Most plant may cost as much as a dollar. Furthermore, Polish and Czech specialists in this domain are very few.

Gas Figures

The last known statistics for natural gas production in the captive area in absolute figures show the following: Roumania — In 1947 production reached 41.5 billion cubic feet; Poland (which lost to Russia two-thirds of its oil fields)—In 1948 production was 5.7 billion cubic feet; Hungary—In 1947 output was 3.5 billion cubic feet; Austria—In 1949 production was 2 billion cubic feet. (Production figures in Europe in effect were regarded as equivalent to consumption of individual states.) Since 1947-49 no figures for natural gas extraction have been published by any captive or Soviet-controlled country, and some of the percentile indices disclosed by those countries are contradictory.

There are reasons to assume, however, that there has been since 1947 a steady though slow increase of production in Hungary and a much more rapid one in Poland and Roumania. Thus, the increase of Polish production in 1950 over that in 1949 was officially described as "an enormous jump" and the output of gas in the third quarter of 1951 was alleged to have been 173 percent of that the whole year before. In Roumania 1950 output increased, according to the official press, by 24 percent in comparison with 1949, and the output of the first half of 1951 was alleged to have been larger by a third than the first half of 1950.

It is not possible to check these assertions, but they may correspond to the truth. Roumania would not be building three plants for the chemical processing of gas unless there were good reasons for expecting an increase in extraction of gas. A hypothetical figure of about 175 billion cubic feet of natural gas, almost entirely dependent on the unpredictable Roumanian output, is the best that can be surmised for the entire captive area by 1954 under the present long-range plans expected to be fulfilled.

Canadian Board Approves Export of Gas to U. S.

ALBERTA Petroleum and Natural Gas Conservation Board has recommended that natural gas be exported from the Peace River area of northwest Alberta. However, the report, climaxing two years of hearings and inquiries on six applications for Alberta gas export permits, was tabled in the Canadian provincial legislature.

Five applications were rejected. The sixth, made by Westcoast Transmission Company, was favored. Westcoast would build a gas export pipe line from the Peace River area west through British Columbia to a point near the international boundary about six miles from Sumas, Washington. A branch line would continue to Vancouver, and the main line would be laid south to the U. S.

Though the recommendation is not binding on the Alberta government, provincial policy is expected to be in line with the board's recommendation. There was little doubt that an export permit would be granted to Westcoast.

The transmission company is backed by a number of firms and individuals holding interests in gas wells in Alberta's northern region. Foremost among affiliated companies is Pacific Petroleums Limited, which has recently conducted an extended natural gas program in the Peace River district.

The conservation board's announcement produced a flurry of activity on western stock markets. Price increases were quoted in rapid succession on stocks of Pacific Petroleums, Peace River Oil and Natural Gas and other companies active in the northern oil and gas play.

The board estimated disposable gas reserves in the Peace River area, 350 miles northwest of Edmonton, at about 500 billion cubic feet. Reserves of 200 billion cubic feet are required to meet the area's needs, the board ruled, leaving a surplus available of 300 billion cubic feet available for immediate export.

From Seattle, Wash., came reports that gas distributing interests in the Pacific Northwest have applied for natural gas shipments from Texas on the grounds that the 300 billion cubic feet reserves of the Peace River sector are inadequate to meet northwestern U. S. demands.

Three steps leading to final approval of Westcoast's proposal remain to be taken: Alberta government must issue the export permit, Canadian Board of Transport Commissioners must approve export of gas into the U. S., which must be followed by approval from the U. S. Federal Power Commission.

Frank McMahon of Calgary, Westcoast Transmission president, said:

"Combined gas resources of northwest Alberta and northeast British Columbia are sufficient for the construction of the Westcoast project. As reserves increase, we contemplate the eventual extension of the line to California. We are going right ahead with our plans. If the Alberta government concurs in the conservation board's recommendation, we will proceed with hearings before the Board of Transport Commissioners in Ottawa in the very near future. And we have a scheduled hearing before the Federal Power Commission in Washington, D. C., on June 16."

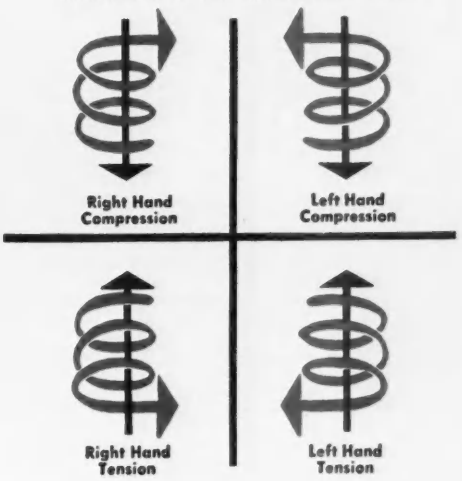
Pipe Made for Russians

Gustav Kliment Steel Works of Komatau (Chomutov), Czechoslovakia, is manufacturing seamless pipe ordered last fall by Russia for the USSR and China. The Czechoslovakian firm is gradually filling the demands at the expense of the nation's domestic oil industry. The pipe, constructed and manufactured from short supplies of Czechoslovakia coal and steel, is being sold at prices which do not cover production costs.

A simple, positive way to REMOVE STUCK TUBING STRINGS FROM YOUR PRODUCING WELLS

BAASH-ROSS PRODUCTION SAFETY JOINTS

4 TYPES TO MEET EVERY PRODUCTION REQUIREMENT



Why run the risk of costly salvage operations every time stuck packers, sanding conditions or similar difficulties jeopardize recovery of your tubing string, when it costs so little to insure recovery by using Baash-Ross Production Safety Joints?

A Baash-Ross Production Safety Joint placed in your tubing string provides a positive means of freeing the string at the point where the Safety Joint is installed, thus permitting important savings to be made in production operations. For example...

▶ Where production packers are used, a Safety Joint should be installed above the packer to permit positive and complete release of the tubing string should the packer become stuck.

▶ Where sanding conditions exist, one or more Baash-Ross Production Safety Joints should be installed in the tubing string to permit selective release and maximum recovery.

▶ Where it may be desirable to change production methods in a well, a Baash-Ross Production Safety Joint should be installed in the tubing string to permit such changes to be made quickly and easily without disturbing the packer.

Baash-Ross Production Safety Joints are simple in design, positive in operation and low in cost. They are provided with a unique locking lug that permits heavy rotational loads to be transmitted through the Joint without loosening it—yet disengagement can be quickly made whenever desired by merely following a simple sequence of operations. A choice of *four* different releasing actions is available—either *left* or *right* hand rotation, combined with either *raising* or *lowering* the production string—thus providing the exact releasing action best suited to each production hook-up.

LEAK-PROOF SEAL... FULL OPENING PASSAGE

Note how the Baash-Ross Production Safety Joint is packed off top and bottom with self-sealing "O" rings to permit circulation without leakage. Also, the Joint is full-opening so that rods, tools and clean-out equipment can be passed without difficulty. In fact, the Joint has the same internal and external diameters as the production string itself. Anything that passes through the tubing string will pass through the Joint... and the Joint itself will pass through anything the tubing couplings will pass through — an important consideration when used with certain suspensions.

QUICK POSITIVE RELEASE

Here's how the Baash-Ross Production Safety Joint operates to protect your tubing strings. The Joint consists essentially of a box and pin releasing thread (either right or left hand, as ordered) that is packed off top and bottom with self-sealing "O" rings. In the upper portion of the pin thread, two vertical lugs are machined into the body, and these lugs mate with a corresponding lug machined into the box portion.

The releasing threads are cut with a loose fit—that is, when the Joint is made up, the two portions can move a short distance longitudinally with respect to one another without affecting the vertical alignment of the Joint. This movement permits the mating lugs to lock and unlock as one portion of the Joint is moved with respect to the other portion—and the design of the lugs determines whether the Joint unlocks in tension or in compression. A shear pin is also provided that permits longitudinal movement of the Joint, but prevents premature rotational release.

Basically, the releasing action consists of first unlocking the lugs by lowering (or raising) the string—then rotating the string in the proper releasing direction (either right or left) to sever the shear pin and unscrew the Joint. Only by first moving the string in the proper vertical direction, then rotating it in the correct releasing direction, can the Joint be disengaged—and by properly selecting the releasing action, other tools below can be set and released without risk of disengaging the Joint.

A Size For Every Production Need

Baash-Ross Production Safety Joints are made of heat-treated alloy steel and are available in all four releasing actions to fit all sizes and types of API Tubing. So no matter what the nature of your particular production operations, you can protect against costly salvage jobs by placing one of these efficient Joints on every tubing string.

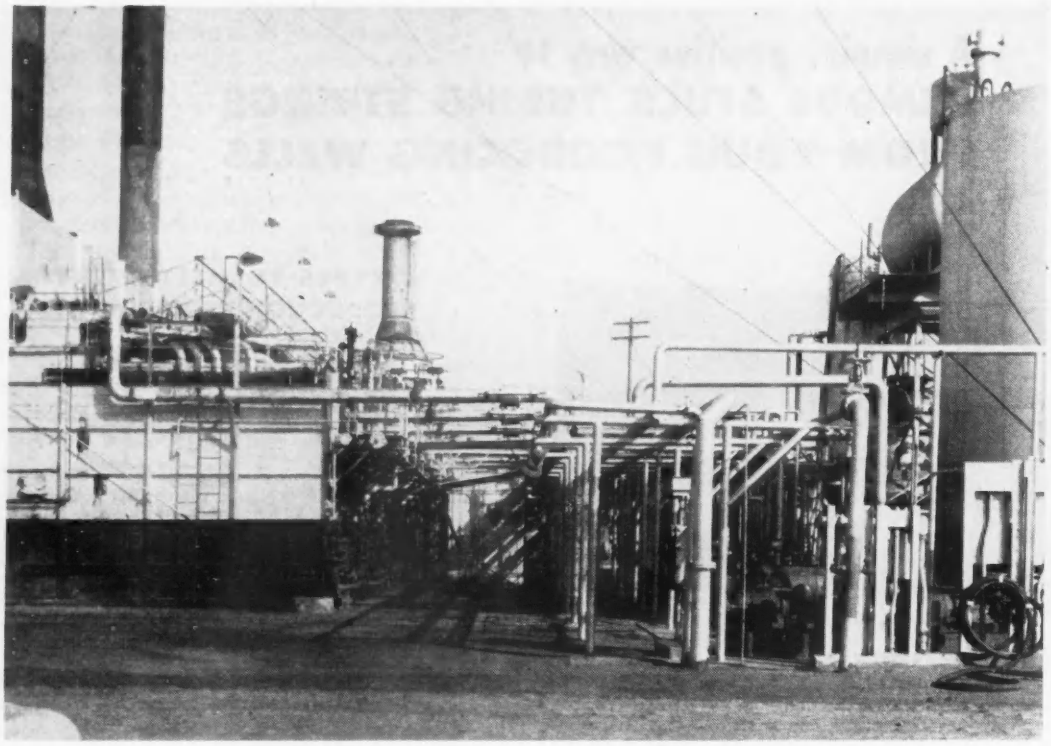
Available through leading Supply Stores

Baash-Ross TOOL COMPANY

BAASH ROSS TOOL CO.

Our 32nd year

GENERAL OFFICES: 5512 SO. BOYLE AVE., LOS ANGELES 58
OKLAHOMA CITY 9 • HOUSTON 1 • ODESSA • CASPER
Export Offices: 11 W. 42nd St., New York 18



These steam generating and water treating facilities provide process steam for the stabilizer operation and water for Dhahran.

By DON KLIEWER
WORLD OIL Staff

To Fulfill Rising Demands in Dhahran

Stabilizing Plant Stretched

ARABIAN American Oil Company's stabilizing plant at Dhahran is an installation of varied purposes, all of which are required by the growing petroleum empire in Saudi Arabia. Strangely enough, into this plant are channeled oil and water, the two repelling forces upon which Aramco's operations in the Middle East depend and which, at the stabilizing plant, are linked by 20th century technocracy to fill the many needs. This plant stabilizes approximately 180,000 barrels of crude daily and produces all the distilled water used at Dhahran. David Swindig, the stabilizer's plant foreman for more than eight years, is justifiably proud of the role which his crew and plant have played in the huge Aramco kingdom of oil.

Each time a fresh water faucet is turned on at Dhahran, out spills part of the 3600 gallons of water distilled each hour at the stabilizer and of the 350 to 400 gallons of soft water produced each minute by the seolite treaters.

But that is in addition to the stabilizer's main job. A major phase of the plant's operation is the moving of more than 300,000 barrels of stabilized crude daily through the 23.6-mile pipe line to the refinery of Bahrein Petroleum Company on Bahrein Island and to Aramco's refinery at Ras Tanura. During summer months, about 130,000 barrels are moved to Bahrein, while 122,000 are moved in winter.

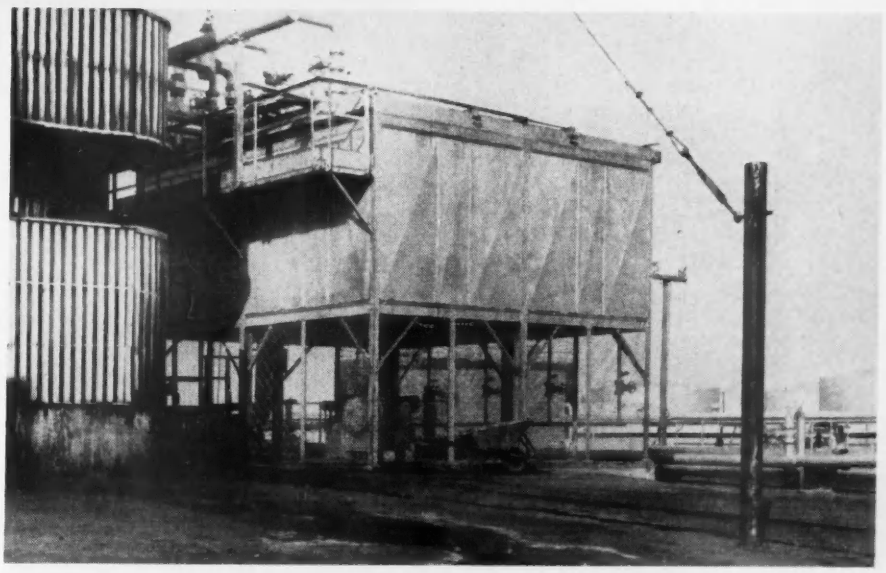
Instead of being flared at the stabilizer, gas is channeled into the gas turbine as power. Between 17 million and 18 million cubic feet daily are available. Still another product produced at the stabilizer is steam used for cleaning equipment at Dhahran. The steam is moved through an 8-inch line carrying a pressure of 200 pounds. Power is furnished by seven water tube boilers.

Handling crude from Abqaiq and Dammam, the stabilizer plant uses a storage supply which includes tanks ranging in capacity from 55,000 barrels to 185,000 barrels. Storage capacity is approximately 1,200,000 barrels.

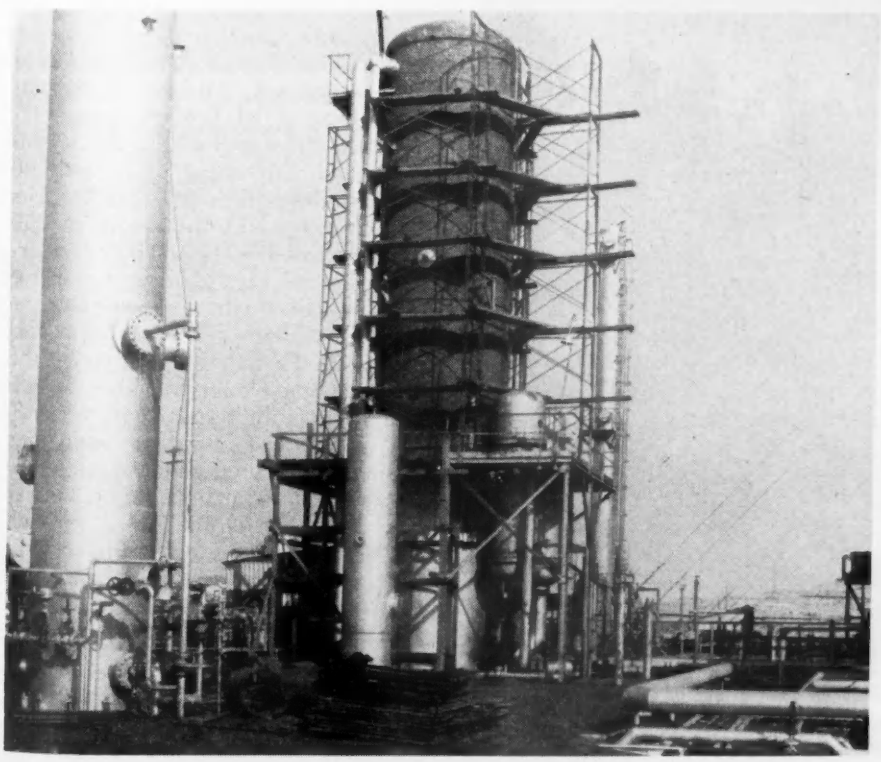
Originally constructed to handle 80,000 barrels of crude daily, the plant has undergone an almost continued enlargement program. To achieve its present capacity, feed lines have been extended, columns have been reworked, bubble caps have been eliminated, pumps and cooling systems have been enlarged. "We've even constructed bypasses around bypasses," Swindig explained.

And so it is that the Dhahran stabilizer plant is meeting and surpassing the demands placed upon it by ever-increasing productivity and movement of crude designed for world markets.

Stabilizer plant foreman David Swindig, right, discusses operations of his installation with the author.



When the demand for steam to stabilizers is low in summer months, this fin fan condenser operates at a maximum capacity to return steam condensate to the boiler plant.



Insulation is being added to the largest of the three crude stabilizer columns.

KINGDOMS OF OIL – No. 13

SMACKOVER, ARK.

From the rip-roaring boom days to efficient methods designed to retrieve vast crude cache

By ANTHONY GIBBON

WORLD OIL Staff

Graves sand well in the Smackover field flowed wide open amid a lake of oil. A number of wells from this sand produced from 15,000 to 70,000 barrels per day during first exploitation period in 1925.

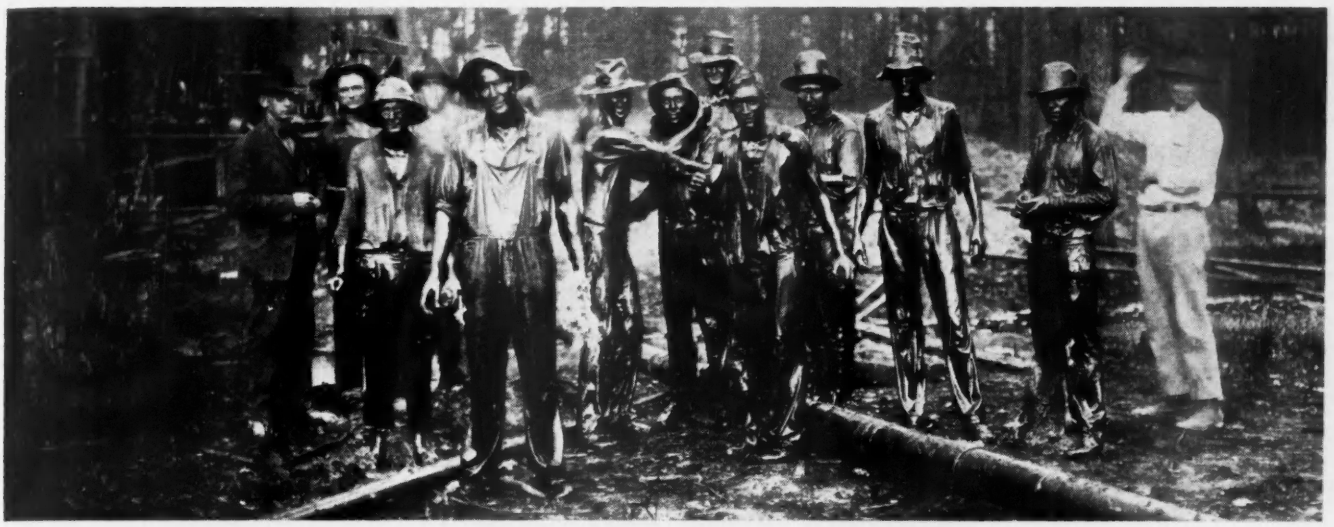
MORE than 30 years after roaring into life out of the flaming cauldron of calamity, Smackover is still producing nearly four million barrels of oil annually and is undergoing an orderly revival sparked by the knowledge that a vast petroleum reserve still remains in the prolific Nacatoch sand about 2200 feet below the surface.

Smackover, Arkansas' largest field, has produced more than half of all the oil produced by the state in the last 30 years (more than 426 million barrels of the state total of 790 million barrels). But so rich is this area, that in a day when a "major" oil discovery is a field with a potential of 100 million barrels, Arkansas' "Old Faithful" still has unrecovered reserves equivalent to three major fields.

Smackover is just 13 miles north of El Dorado, Ark., another of the nation's historic oil fields.[1] Geographically, the area resembles a great shallow bowl stretching out over 40 square miles within an encircling rim of high ridges. In the center of this natural bowl lies the town of Smackover. Legend says it derives its name from pioneers who followed in the wake of foraging French and corrupted the French designation for the area—Sumac-Couvert (covered with sumac) into the name "Smackover."

World War I had come and gone, raising no more than a fragmentary ripple upon the calm pool of Smackover life when word seeped through the nomadic oil fraternity that the El Dorado area "looked good," and several pioneer oil men visited the section. A number of leases were purchased at the going price of "two bits" an acre, or less.

January 10, 1921, oil was discovered at nearby El Dorado, and



Oil-covered drilling crew bathed in the black gold that sprayed the countryside and marked another Smackover gusher.

Many a strong mule dropped from exhaustion and drowned in lakes of mud in Smackover, center of one of the wildest booms in the history of oil.

Mules and flat bed wagons slogged through pine forest and muddy roads with supplies for the Smackover field.

Smackover, of course, basked in reflected glory. Leasing leapfrogged out from El Dorado in all directions—to Norphlet, midway between El Dorado and Smackover; then overnight to Smackover itself, then farther north to Louann and beyond.

Smackover history was in the making.

It began with the location of Oil Operators Trust J. T. Murphy 1, a rank wildcat without the benfit of geology, staked on a knoll near the sleepy little village of Norphlet.

Drilling began in the winter of 1921. On April 22, 1922, at a depth of just below 2000 feet a few gas bubbles appeared in the slush pit. Drilling was halted to await developments. At 6 p.m. the well had not yet come in and the crew went to supper.

According to oldtimers the well blew in "with one hell of a roar" while the crew was gone. In that fateful instant the pentup force of billions of cubic feet of gas trapped below the surface burst its bonds and screamed upwards in volcanic proportions into the twilight that gathered swiftly in the surrounding forest.

Supper was forgotten as the crew raced back to the well site. But the rig was gone, blown to the winds even before the first man arrived at the scene. From the spot where the rig had stood a tremendous gas jet was shooting great balls of red sand high into the air and deafening drilling crews a mile or more away with its shattering sound. Within a few hours the boilers that had powered the drilling rig, the surrounding trees, everything within the area, had vanished, dropping downward into a colossal grave. By morning, a yawning crater marked all that had been the J. T. Murphy 1, discovery well of Smackover.

When the first terrifying energy of the escaping gas was spent and the early fury had subsided, people came from all over the country to view the giant 400-foot deep crater that had engulfed more than an acre of land. In the bottom of this tremendous bowl was a bubbling mixture of oil and water—a veritable witch's cauldron—which remained alive for many months. The Norphlet crater is still a point of interest for visitors.

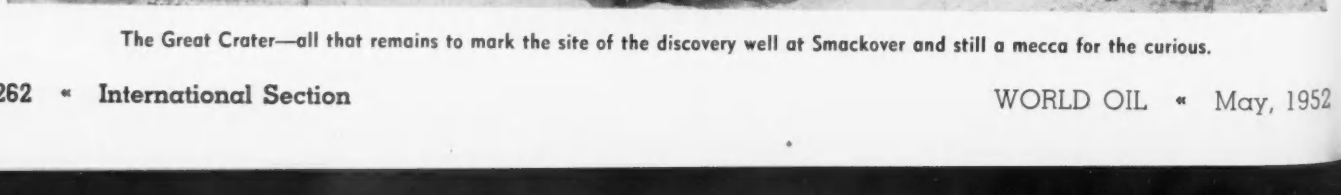
During the eruption, the well spewed an estimated 30 million cubic feet of gas daily from the Nacatoch sand at approximately 2025 feet. The well had been drilled near the apex of what is now recognized as the Norphlet Dome, with the bit penetrating into the heart of the area where the original gas cap must have occupied the major portion of the sand section.

Other blowouts occurred as hundreds of inexperienced operators

Smackover—scene of one of the nation's most spectacular oil booms.

Hastily-constructed earthen pits reflect a forest of derricks dotting the countryside at Smackover at the height of the boom.

Teams of oxen vied with strong-backed mules to haul supplies into the burgeoning Smackover pool.



The Great Crater—all that remains to mark the site of the discovery well at Smackover and still a mecca for the curious.

drilled the area, and in a short time the great Norphlet Dome gas cap was permanently dissipated, a circumstance that determined within an extremely short time the amount of oil Smackover would produce the easy way.

The first oil well successfully completed in the area was the V.K.F. Oil Company's Richardson 1, completed in the Nacatoch at about 2000 feet. Within a year, more than 1000 producing wells had been completed and 25 million barrels of oil had been produced.

Waste characterized the early producing days at Smackover. Lack of a ready market as well as inadequate transportation forced producers to store their oil in wooden tanks and open earthern pits. Many tanks collapsed and the pits were washed away. Great pools of oil flecked the countryside, evaporating into a worthless goo, blazing with careless fires or sinking into the sandy top soil. Low waterways became literal rivers of oil, flooding down to Smackover Creek in a scene of waste and destruction probably never equaled in oil history.

Men lived in hastily-erected shanties, crowding closely together in the feverish easy-money living of flush production that changed unshaven, overall-wearing, mud-smeared men into kings—all at the turn of a drill stem and the bite of a fishtail bit.

In October, 1922, production was extended beyond Smackover to the Louann district, but Nacatoch production there was disappointing and led to deeper drilling and discovery of the Meakin Sand. The Lion Oil Company of El Dorado went still deeper, to 2501 feet, and opened the Graves sand, third major producing zone in Smackover. Deeper drilling tapped three more producing zones in the Blossom sands at 2600 feet, then the Lower Travis Peak sand, an unproductive Cotton Valley group and a thin, disappointing stratum in the Buckner Beds. Finally, at nearly 6000 feet, drilling was halted in the Smackover limestone, the lowest producing horizon.

Some initial production figures from the Smackover wells are breathtaking and give a real perspective on the reasons for the excitement that heralded its discovery.

The largest well completed in the Nacotach sand had an initial daily output of 25,000 barrels of oil. Several wells produced 5000 to 10,000 barrels per day, plus from 30 to 50 million cubic feet of gas.

Average daily production from the Graves sand was on the order of 2000 barrels per day, although a number of wells produced from 15,000 to 70,000 barrels per day during the period of initial exploitation in 1925.

Forest ranger tower marks the peak of Norphlet Dome gas cap, once the scene of wild activity as it "blew out."

Wells drilled in the Blossom were generally small, although some of the larger wells produced as much as 3000 barrels daily and 50 million feet of gas. Wells in the Smackover limestone in the Snow Hill community averaged "only" 130 barrels of oil daily.

With more than 3000 wells producing in 1925, a peak production of 69 million barrels of oil per year was attained.

The number of wells in the field has fluctuated widely during the past 20 years. Disastrously low prices for crude in the early 1930's forced abandonment of hundreds of small producers. Major strikes in other areas lured many operators.

On January 1, 1930, there were 2998 producing wells in the field. In 1933 Smackover produced 8,312,905 barrels of oil. At the end of June, 1946, about 1528 wells in the field were producing more than 4 million barrels of oil per year.

All wells now are on artificial lift and produce large quantities of water. Yet this natural water drive is proving beneficial in flushing out the producing horizons and provides the energy for Smackover's current production of about 11,000 barrels of oil per day, maintaining its annual output at a consistent 4 million barrels.

Initial production figures throughout the field were, by all standards, sensational; but wasteful practices of the early days rapidly dissipated the primary energy and scores of wells were prematurely abandoned, leaving large quantities of oil impossible of recovery by the uneconomical and antiquated operating techniques of the day.

The revival currently under way in Smackover lacks the flavor and color of the field's early days, but it is marked with efficiency, precision and speed. Most drilling is within the area east of the Smackover townsite, where more than 2000 wells were drilling 25 years ago.

The old, riproaring days of the Smackover boom have passed into history, but the glamor and glory remain. There's still the old wooden derrick atop the Norphlet Dome, converted into a lookout tower for forest rangers who guard the fortune of growing timber that rubs elbows with the forest of derricks. From its precarious steps, one may gaze out into a mist-shrouded distance at the vast cuplike formation of the Smackover field with its perimeter-bounding horizon.

Down below and as far as the eye can see are the hills, the swamps, and the rigs operated by the same breed of plucky men who were there three decades ago.

While below the surface, deep in the warped and pressing strata of the broken mountains and hidden seas, 300 million barrels of oil still remain to be brought to the surface by those with the vision, courage and ingenuity to solve the problems posed by its recovery.

REFERENCE

[1] "El Dorado, Ark." Anthony Gibbon, WORLD OIL, July 1, 1951 (Kingdoms of Oil, No. 5).

ACKNOWLEDGMENT

Thanks to *Lion Oil News*, The El Dorado Chamber of Commerce, and The Lion Oil Company, who furnished data and pictures.

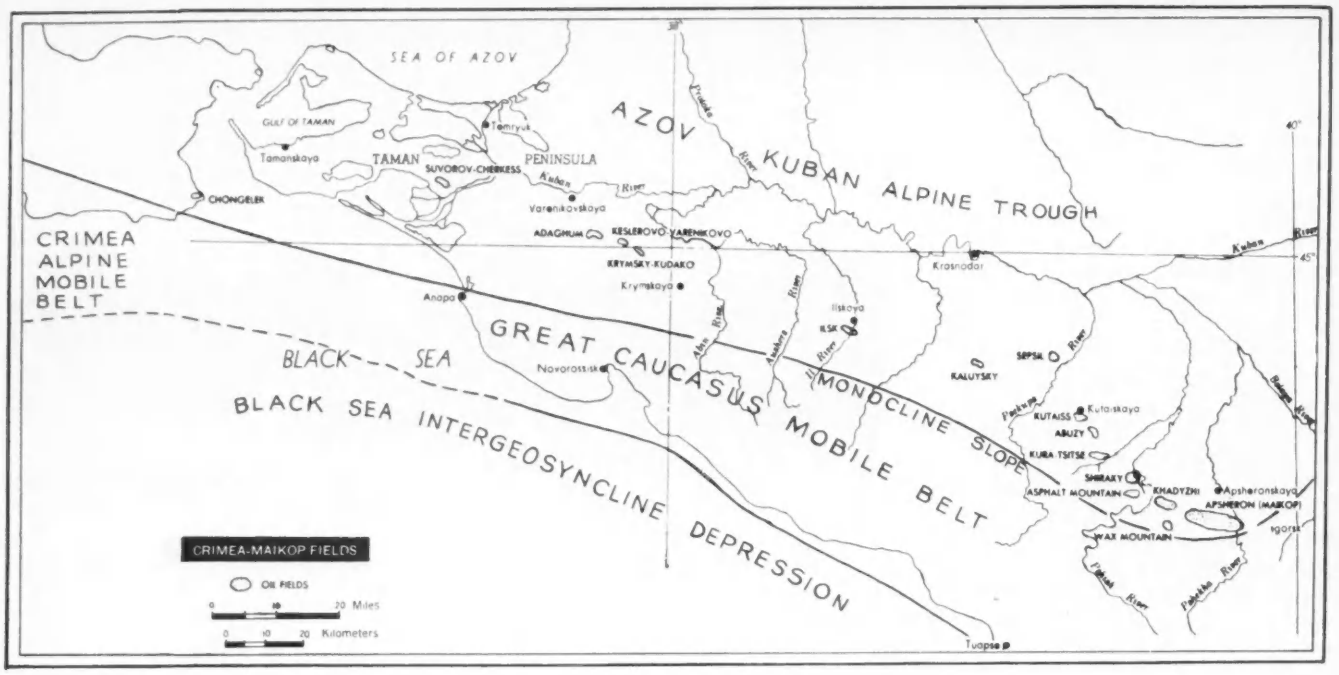


FIGURE 5.

Oil in Russia

Carpathian Trough Territory, Formerly Owned by Poland, Occupies High Place in Soviet Union's Drilling Program

Part 3

By DR. LEONID SMIRNOV

THE cis-Alpine trough runs along the Alpine system of the Carpathian Mountains, the Crimea and the Caucasus. It is divided, by a transverse elevation, into separate quasi-independent troughs. The entire Alpine trough is exceptionally rich in oil.

The territory of the Carpathian trough formerly belonged to Poland, but since 1939 it has formed a part of the Union of Soviet Socialist Republic. Much attention is being paid currently to exploration and drilling in this trough. The trough's oil-bearing structures are the complex-built folds in the Tertiary deposits, complicated by a salt tectonic. At the present time structures at the outer rim of the trough and the Paleozoic structures situated near the edge of the Russian Platform, adjoining the Carpathian trough, are being explored.

In the Soviet-controlled area of Europe lies a series of individual portions of the cis-Alpine trough, representing separate basins. One of such individual troughs is the Azov-Black Sea trough and another the Terek-Karaboghaz trough. They are separated by a transverse elevation of the basement of the trough, known as Stavropol elevation. Azov-Black Sea trough is separated from the cis-Carpathian trough reaching into Bulgaria and Roumania by the North Crimea transverse elevation. On the latter elevation, in the steppe area of Northern Crimea, gas and oil bearing rocks of Tertiary and possibly also of Mesozoic have been established (Melitopol region).

On the inner (southern) steep slope of the trough, partly on the western immersion of the structure of Big Caucasus and its passage into the structure of mountainous Crimea, lie the Kerch and the Taman basins composed by Tertiary rocks. In these basins, numerous structures, often of the diaper type, have been uncovered. All these structures are oil-bearing, but thus far no drilling work has been done there. (Figure 5.)

Structures on the southern slope of the Azov-Black Sea trough, situated on the monoclinal flank of Big Caucasus, are very rich in oil. This oil-bearing area is often referred to as Maikop area (Figure 5). The oil bearing here is confined to Maikopian deposits (Lower Miocene, Upper Oligocene), Eocene and Paleocene.

In postwar years, commercial oil bearing was found in Mesozoic (Aptian Cretaceous) deposits. To the north, toward the Taman Peninsula,

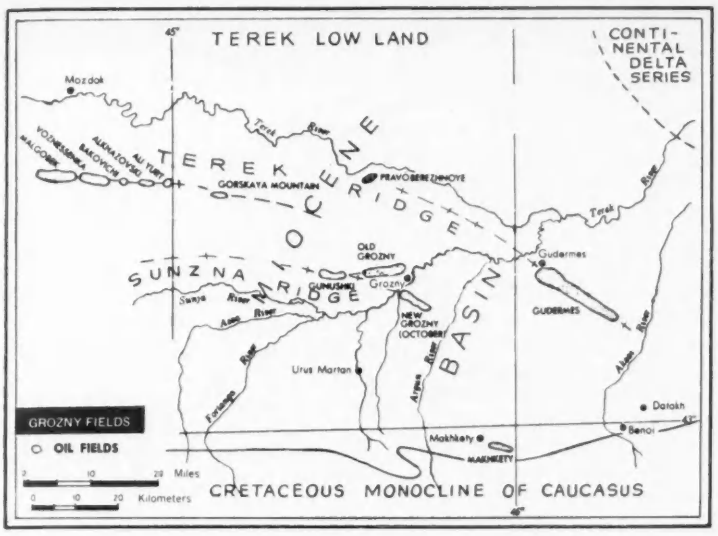


FIGURE 6.

FIGURE 7.

Miocene and Pliocene deposits have proved oil-bearing. A study is being made of the Jurassic and Triassic strata of the monocline of the Big Caucasus that overlie ancient Hercynian and Caledonian structures of the latter. There is reason to assume the presence of reef formations in the Upper Jurassic (covered by evaporites) and in the Triassic. By the seismic method, structures have been uncovered in the central portions of the trough, structures removed from the monocline (Stanitza Mingrelskaya). Potential of the Maikop oil-bearing region is very great; the region has substantial oil reserves.

Southeast of the Azov-Black Sea trough lies the Terek-Karaboghaz trough that runs along Southeastern Caucasus. It is separated from the Azov-Black Sea trough by the Stavropol transverse elevation. On this latter elevation, commercial oil and gas-bearing horizons have been uncovered in the Maikopian, Eocene and Paleocene deposits. Structures on this transverse elevation of the trough are expressed by large slanting anticlines and domes (Singeleiev structures and others).

With the Terek-Karaboghaz trough are connected the important oil-bearing regions of Grozny and Daghestan. Oil fields of Grozny region are tied to overthrust, often broken folds that form two foremost ranges, the Grozny and the Terek ranges, on the inner (southern) slope of the trough. Oil-bearing in the Grozny region are the deposits of Miocene, the Karagian and the Chokrak horizons of the II Mediterranean Stage. There are 22 oil horizons in the Grozny oil field (Figure 6). Oil production also spreads into the Trans-Terek plain, to the north of the foremost ranges. In this Trans-Terek plain, near the Caspian Sea, in postwar years a thick continental Pliocene series was uncovered, similar to the productive continental series of the Apsheron Peninsula, with good oil occurrences, which is under drilling at the present time.

Also, in postwar years, a large new oil field, Tashkala, was revealed on the eastern immersion of the Old Grozny fold. Potentials of Grozny region are very great. Besides the already known oil fields, many unexplored structures exist there. Additionally important, too, are the flanks of the structures, lying beneath overthrusts.

Daghestan Region

The oil-bearing Daghestan region (Figure 7), like Grozny region, also lies on the southern rim of Terek-Karabokhaz trough in a narrow belt between the lofty Daghetsan and the Caspian Sea. Daghestan oil fields are a continuation of the Grozny oil fields. The latitudinal stretch of the Grozny folds changes abruptly beyond the Daghestan wedge on the northwest. As in the Grozny region, oil is connected with deposits of Miocene, i.e., the II Mediterranean Stage.

In the southern portion of Daghestan Maikop deposits are oil-bearing. And, like in Grozny region, Daghestan structures are characterized by overturned folds complicated by overthrusts, frequently overthrown in the direction of the Caucasian Mountains. Prospects of Daghestan are considerable.

Oil-bearing basins of the cis-Alpine trough within the boundaries of European USSR are limited to the aforementioned. But the cis-Alpine trough continues on into Central Asia and passes into China. Before turning to the Central Asia cis-Alpine trough, some attention must be given the excellent oil-bearing province of the Apsheron Peninsula—Kura depression, lying within the intra-geosynclinal depression that divides the Caucasus into the structure of the Big Caucasus—and that of Little Caucasus.

This intra-geosynclinal depression is divided by the Dzerul' massif (elevated basement of the depression) into two separate depressions, (eastern) Kura-South Caspian and the (western) Black Sea depressions. The western depression includes the oil-bearing Tertiary basin of Abkhasia and West Georgia, while the eastern depression includes the oil-bearing Tertiary basins of East Georgia, Kirovobad, Kura depression, and Apsheron Peninsula.

The intra-geosynclinal depression begins at the eastern shore of the Caspian Sea in Western Turkmenia, at the point where the Alpine Asian system, stretching from Pamir, through Hindu-Kush and the Turkmeno-Khorossan Mountains, breaks up into two branches. One branch runs north through Bolshoi Balkhan into the structure of the Big Caucasus; the other runs south through the system of Elburz, on the southern shore of the Caspian Sea, into the structure of the Little Caucasus, and from there farther into Eastern Anatolia (Turkey).

Oil-bearing deposits in this de-

pression are those of Paleogene, Miocene and Pliocene. The Paleogene-Maikop series (Upper Oligocene and Lower Miocene) are oil-bearing in the Kirovobad region, along the southern rim of the depression, on the monoclinal northern slope of the Little Caucasus. Miocene deposits are oil-bearing in East Georgia, West Georgia and Abkhasia, and probably oil-bearing in the Kura lowland and on Apsheron Peninsula, too. Their oil bearing has been proved in the Divitchi region, north of Apsheron Peninsula.

Especially important, from oil-bearing viewpoint, is the productive formation of Pliocene age of the Apsheron (Baku) Peninsula and Kura lowland. The productive formation, over 450 feet thick, in its upper regions represents deltoid deposits of Paleo-Volga and Paleo-Kura and in its lower regions, lagoonal deposits of a relict post-Pontic basin that embraced the southern part of the Caspian Sea. In a westerly direction, the Pliocene productive formation passes into continental deposits of the Shirak productive formation of East Georgia.

The richest known oil fields of the Apsheron Peninsula (Baku) are located in the southeastern immersion of the Southeastern Caucasus and belong to the Tertiary basin of the intra-geosynclinal depression. More exactly, to its northeastern rim. Structures of Apsheron Peninsula (Figure 8) are laid out in the shape of arcs, skirting a shelf of Mesozoic structures of Southeastern Caucasus, immersed to the southeast.

Exhaustion Near?

They represent dome-like folds broken by faults. Frequently connected with them, especially at the periclinal ends, are mud volcanos. In the direction toward the southeast, the structures immerse more and more. From the Kura depression, Apsheron Peninsula is cut off by a sizable fault that conforms with the marked upheaval along which the structure of the Big Caucasus was uplifted and thrust over the intra-geosynclinal depression. One opinion holds that the Baku oil fields are already in the exhaustion stage. But this may be true only with regard to the upper horizons of the productive formation of the old areas.

During the last 25 years, many new structures have been discovered and brought under exploitation. And new structures are being uncovered all the time. In postwar years, one of the richest oil fields, Buzovna, was discovered. Many structures are under the sea; part of them have already been uncovered by the seismic method more than 15 miles offshore. Some have been drilled, with oil being obtained from a number of these marine structures.

Potential geological oil reserves on the Apsheron Peninsula are on the order of 21 billion barrels. Before the war, proved reserves amounted to about 4 billion barrels. Prospects for oil in the entire Kura depression are very great, especially in East Georgia (Figure 9) and in Kirovobad region. Also promising in this respect is the western portion of the intra-geosynclinal depression, i.e., the Black Sea depression with its oil-bearing regions of West Georgia and Abkhasia. The eastern portion of the intra-geosynclinal depression on the eastern shore of the Caspian Sea, is likewise a large basin of Tertiary time, with which the oil-bearing region of Western Turkmenia is connected. Oil of this region is confined to a red-colored productive formation similar to the productive formation of the Apsheron Peninsula, representing deltoid deposits of the river Paleo Amu Darya that once flowed into the Caspian Sea. Oil reserves of Western Turkmenia are considerable (Figure 10).

(This is the third of a series)

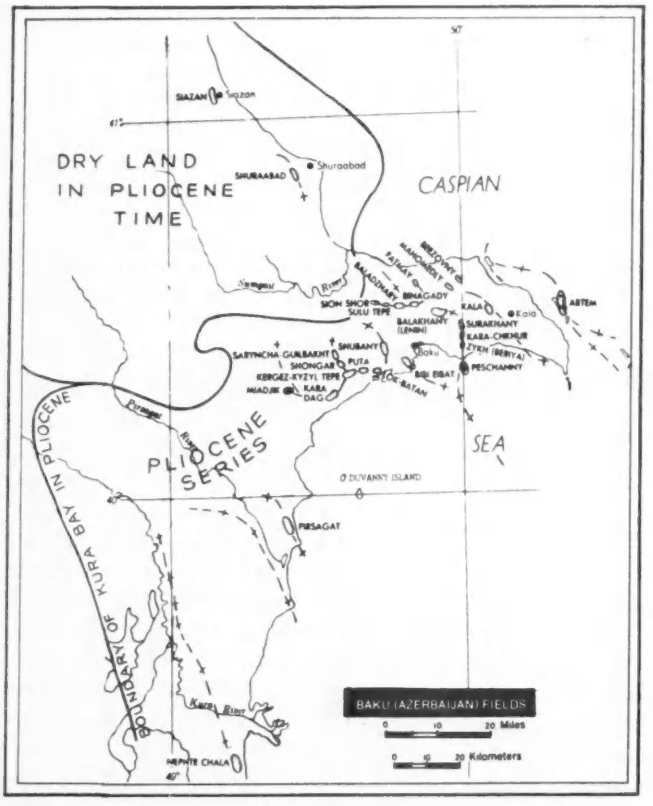


FIGURE 8.

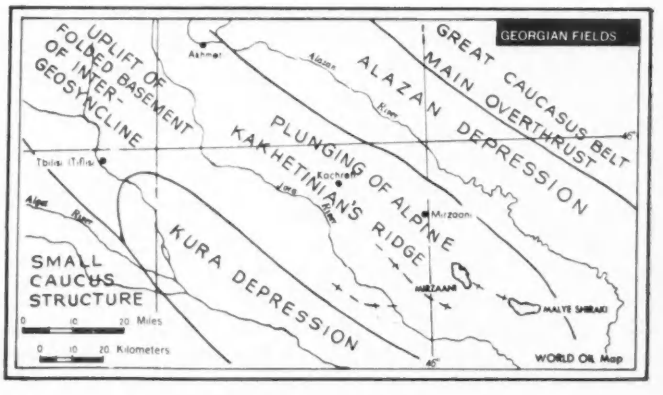
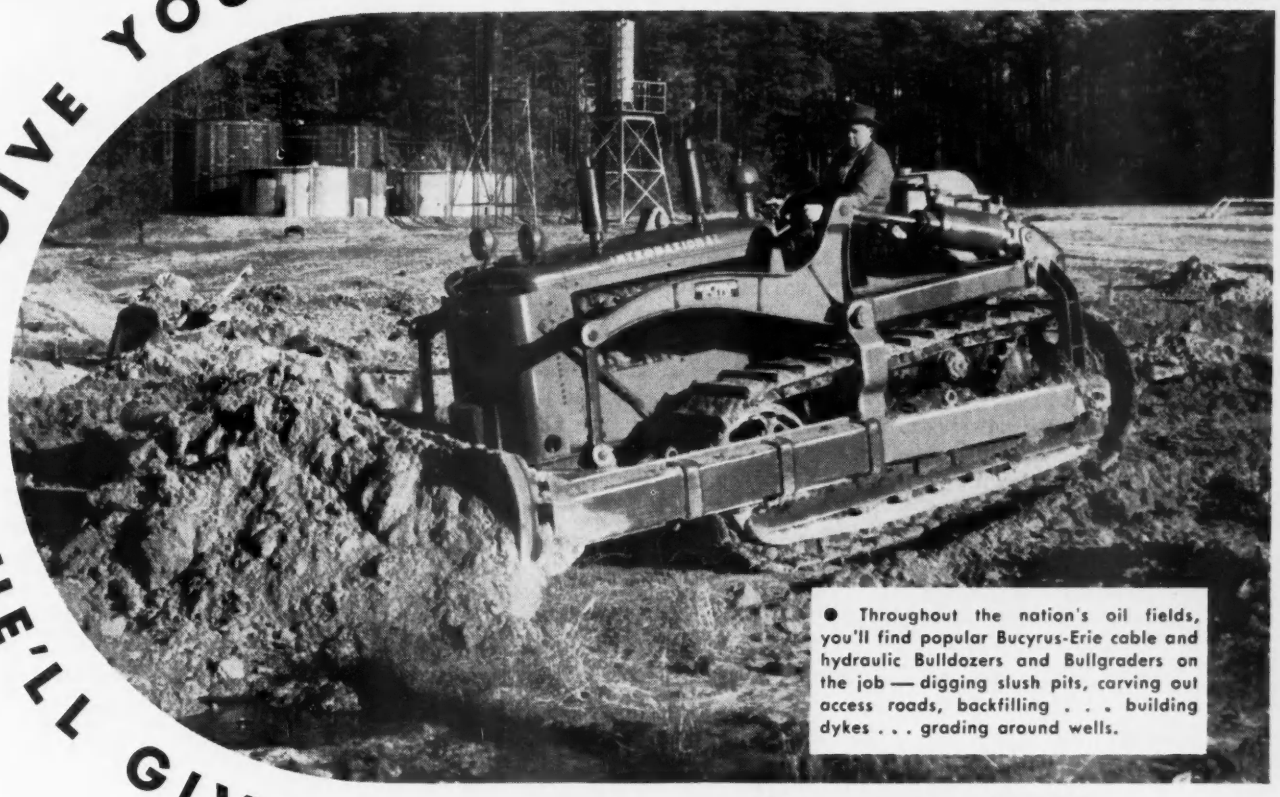


FIGURE 9.

FIGURE 10.

GIVE YOUR OPERATOR THE OUTFIT



● Throughout the nation's oil fields, you'll find popular Bucyrus-Erie cable and hydraulic Bulldozers and Bullgraders on the job — digging slush pits, carving out access roads, backfilling . . . building dykes . . . grading around wells.

HE'LL GIVE YOU THE OUTPUT

BUCYRUS ERIE

BULLGRADERS and BULLDOZERS

With an easy-to-handle Bucyrus-Erie Bulldozer or Bullgrader your operator has a digging tool that's designed to give him the most in work capacity and safety — at a minimum of effort. For example:

He Sees What He's Doing . . . The operator can see exactly what the blade is doing — and stay seated. No superstructures to obstruct his vision.

. . . Is In Complete Command Center of gravity is kept low for greater stability when working on steep banks. Also with tractor balance point kept practically intact, blade doesn't tend to nose over at the edge of the dump, tractor works at top efficiency.

. . . And Comfortable Single, four-position hydraulic control lever is within easy reach of the operator, yet does not interfere with tractor controls. Winch control levers for cable-operated blades are easy to operate — conveniently located.

In addition, Bucyrus-Erie Bullgraders can be angled and tilted by the operator in a few minutes without special tools. Lubrication points are easily accessible. Your International Industrial Tractor distributor will be happy to give you full details.

34T52

See Your INTERNATIONAL Industrial Tractor Distributor

BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

Iran's Daily Production Sags To 32,000 Barrels, Says Official

SINCE Anglo-Iranian Oil Company was forced out of Iran last July, National Iranian Oil Company operations have been at the minimum required to meet domestic demand. Actually, little need existed for even those limited activities, for with AIOC's departure Iran inherited 14,440,000 barrels of crude products in storage, the equivalent of a 577-day-plus supply for the nation. No oil was exported.

These facts were revealed after a questionnaire submitted by WORLD OIL to National Iranian Oil was answered by A. Homayoonfar, the company's general fields manager.

Subsequently, however, Iran announced that it will sell 18,915,000 barrels of crude to Norway, Denmark and Finland. Delivery is scheduled to begin on or about May 3, and Spanish tankers reportedly will take the oil to Italy for refining.

Meanwhile, Robert Gardner, World Bank vice president, has invited Hussein Maki, secretary general of Iran's oil nationalization board, to visit the U. S.

NIOC claims in the questionnaire that it has produced a total of 4,999,000 barrels of crude from Iran's eight fields, for a daily average of 32,600 barrels, since Anglo-Iranian pulled out. According to NIOC, year-end production was averaging 37,770 barrels daily from 87 producing wells.

In comparison, Anglo-Iranian's 1951 production reached a peak of 700,285 barrels daily in February, and thereafter declined as the proceedings of expropriation advanced to 115,900 barrels daily in July—the last full month the company was permitted to operate in the country. During its 1951 operations, Anglo-Iranian produced from 84 wells, or three less than were being produced by National Iranian Oil, but Anglo-Iranian said some of the 84 wells were marginal producers.

Before leaving Iran, Anglo-Iranian had processed a total of 82,330,123 barrels of crude oil at the Abadan refinery. According to NIOC, total runs to the Abadan refinery for all of 1951 were 97,692,741 barrels, indicating that during its period of operation the Iranian company reached a peak operating level of near 100,000 barrels daily. The refinery has capacity for crude runs of 550,000 barrels daily. At year's end NIOC said 4 percent of the capacity of the Abadan plant was in operation. In addition, NIOC was operating the 2400-barrel daily Kermanshah refinery at 98 percent of capacity.

Assuming Iran's domestic demand for petroleum products of about 25,000 barrels daily has been maintained under the distribution system of National Iranian Oil, it would indicate that, with crude production averaging 32,600 barrels a day, a total of 1,162,800 barrels of crude and products were added to storage during the August-December period. This would increase the total amount in storage to nearly 16 million barrels, compared with an Anglo-Iranian reported tankage capacity in Iran for 19,760,000 barrels. Actually, available storage to be filled was less than these figures indicate. When the British company left, its storage of motor gasoline was at capacity, and the only available storage capacity existing was for crude, kerosine and some heavy fuel oils.

During its seven months of operations in Iran last year, Anglo-Iranian reported completion of seven producing oil wells. National Iranian says eight wells were completed during the year, seven of which were producers. One additional well is shown as having been completed in the Lali field as a dry hole. A check with Anglo-Iranian shows one additional well in that field was nearing completion at the time of the company's departure.

NIOC reported that as of the end of 1951 a total of 21 wells were being drilled. This was broken down as two wildcats drilling in the Ahwaz area, seven wells in the Agha Jari field, five in the Lali field and seven in the Naft Safid field. Though such operations are reported by National Iranian, only 15 drilling rigs (three of which were for exploratory operations) were left in Iran by Anglo-Iranian. If NIOC figures were correct, it would mean 21 wells were being drilled simultaneously with 15 rigs!

The two wildcat wells in the Ahwaz area, scheduled to go 10,000 feet, were drilled by Anglo-Iranian to about 9000 feet each before the end of last July. In addition, Anglo-Iranian was drilling in the Pazanum area with its third exploratory rig. While Anglo-Iranian had completed only seven field wells before the end of July, five additional field wells were being drilled in addition to the three wildcat locations. Historical evidence of drilling time in Iran shows one rig operating full time is capable of drilling 1⅓ wells per year, indicating that if all 15 of the Anglo-Iranian rigs had been in continuous operation since the first of last year (which was not the case), a maximum of 20 wells would have been completed during 1951.

Some indication of the future operations of National Iranian Oil may be indicated before the hearings of the International Court at The Hague, scheduled to begin May 8, though a postponement to June 6 has been requested by Premier Mossadegh of Iran. These hearings are on petition of the British government and Anglo-Iranian to judge the merits of the case. Little may be accomplished since the Iranian government has insisted the Hague court has no jurisdiction over internal matters in Iran.

Production, Producing Wells and Drilling in Iran for Year 1951

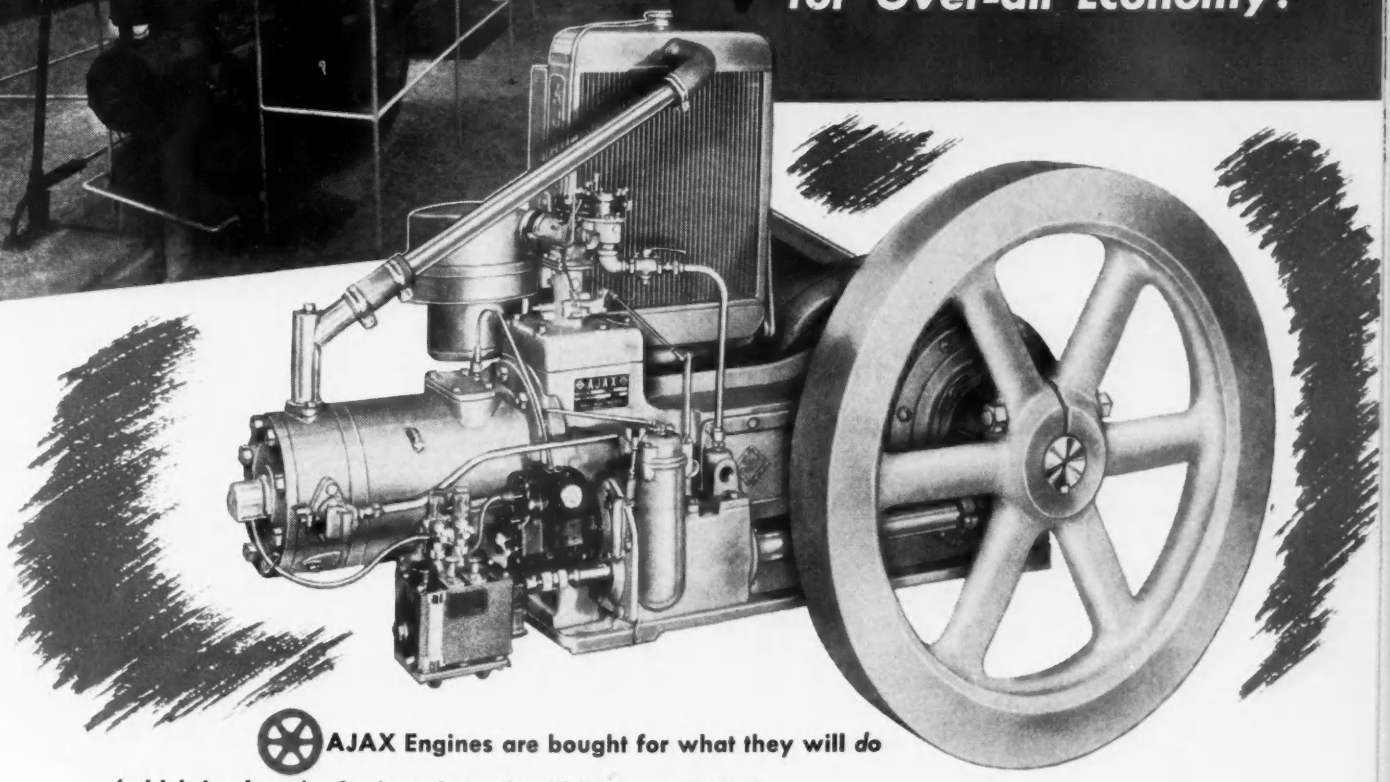
Name of Field	Number of Producing Wells at End of Year	Total Oil Produced During Year (Barrels)	Daily Average Production at End of Year (Barrels)	Total Number of Wells Drilled in Year	RESULTS OF DRILLING		Number of Wells Drilling at End of 1951
					Oil Wells	Dry Holes	
Ahwaz	0	0	0	0	0	0	2 (wilcats)
Gach Saran	4	9,803,856	26,858	0	0	0	0
Naft-i-Shah	2	1,736,199	4,758	0	0	0	0
Agha Jari	17	66,373,081	182,119	3	3	0	7
Haft Kel	21	31,139,753	85,318	0	0	0	0
Lali	4	3,304,754	9,052	2	1	1	5
Masjid-i-Sulaiman	32	11,614,505	30,179	0	0	0	0
Naft Safid	7	3,975,096	10,891	3	3	0	7
Pazanum	0	0	0	0	0	0	1 (wildcats)
Total	87	127,947,164	349,175	8	7	1	21

Ajax

FIRST IN THE FIELD!

GAS and OIL ENGINES

✓ *for Dependability!*
✓ *for Over-all Economy!*



AJAX Engines are bought for what they will *do* (which is plenty)—for how long they'll keep on doing it (that means year after year)—and for how little it takes to keep 'em rolling (*very* little). Oil men all over the country know Ajax and buy Ajax when they want the best. *Ask your Supply Man!*

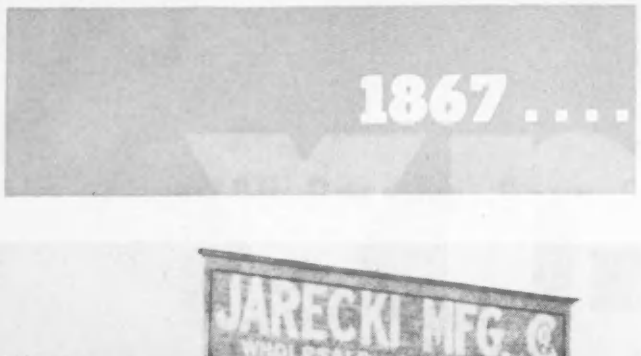
LEADERSHIP 1877 1952 Ajax GAS AND OIL ENGINES

AJAX IRON WORKS

Manufacturers of Gas Engines • Steam Drilling Engines • Industrial Steam Engines

CORRY, PENNSYLVANIA

Oil Field Distributors: THE NATIONAL SUPPLY CO., TOLEDO, O. R. B. MOORE SUPPLY CO., INC., BOLIVAR, N.Y.



The first Jarecki oil field supply store was established in 1867 at Pithole, Penn. Above is the Clarendon, Penn., store, which was operated until recent years.

Today Jarecki International has 15 modern oil field supply stores in six states. Above is the Jarecki International store at Snyder, Texas.

Jarecki Marks 100th Anniversary

Older Than the Oil Industry Itself, H. K. Porter Company Supply Division Begins Its Second Century of Service

By WALLACE FITZGERALD, WORLD OIL Staff

JARECKI International Supply Division, older than the oil industry itself, this year marks its 100th anniversary. The history of Jarecki, now a division of the H. K. Porter Company, Inc., Pittsburgh, is a history of the oil industry.

Today Jarecki International is the oil industry outlet for more than 200 manufacturers of oil field supplies and equipment and is making great plans for the future.

The Jarecki story had its beginning in Erie, Penn., in 1852. This was seven years before a one-time railroad conductor, Col. Ernest Lawrence Drake, startled the world with the discovery of oil by drilling at Oil Creek near Titusville, Penn.

Midway of the nineteenth century, two young brothers, Henry and Charles Jarecki, migrated from Posen, Germany, to the U. S. Steeped with the ingenuity of their German ancestors, they settled in Erie and set out to seek their fortune.

Founded in 1852

In 1852 they founded Henry Jarecki and Company in a little machine shop and began making brass pipe fittings, valves and brass specialties. Two crude lathes and a melting furnace were the only equipment.

Customers included the owners of salt wells then being drilled in northwestern Pennsylvania. But times were hard in the early 1850's. A minor panic had put 20,000 men on the breadlines in New York City. The rest of the country was hard hit.

It was in such a setting as this that the infant Seneca Oil Company commissioned Col. Drake to seek oil in Pennsylvania by drilling. The Drake story has been told many times. How many called the venture a folly. The many hardships and failures. How Col. Drake stuck by his rig and on Aug. 27, 1859 proved that oil could be recovered in great quantity by boring into the earth.

The existence of oil had been

known long before, but the Drake well generally is recognized as the beginning of the oil industry. And with it came Jarecki . . . and the oil field supply industry.

The news that Col. Drake had struck oil was a signal for a stampede such as the country had not seen since the gold rush '49. Men who had jeered at the idea of drilling for oil were to spring into action. Up and down Oil Creek they went, buying and leasing land.

Called on Drake

But the brothers Jarecki had been among the first who recognized the possibilities of a new industry. Jarecki representatives called on Col. Drake and his associates while they were drilling the first well. And Col. Drake apparently had as much faith in the Jareckis as they had in him, for the first drop of oil to flow from America's first well traveled through brass fittings made by Jarecki.

The oil industry prospered and so did Jarecki. By 1862 there were 75 flowing wells in the Oil Region of Pennsylvania. Jarecki Manufacturing Company, as it was then called, turned to making oil field supplies almost exclusively. Not only fittings and valves, but other items such as vises, wrenches, etc. A wrench exhibited at the Drake Well Museum today was patented by Albert Jarecki, son of Henry Jarecki.

In the early 1860's there were two types of men in the Oil Region of Pennslyvania—the "get-rich-quick" group, who gathered in their loot and hurried back to "civilization," and those who saw an industry in the making and settled in the oil towns to stay. The Jareckis were in the latter group.

New Factory Built

The Oil Region spread. Oil City . . . Pithole . . . Pleasantville . . . Jarecki grew, too. The company outgrew its original site and a small factory was

FROM THIS

TO THIS

TO THIS

As the oil industry grew, so did Jarecki. In 1870 a small factory was built on the banks of Mill Creek in Erie, Penn. This factory grew until it covered almost an entire city block (top photo). Then in 1889 an iron foundry was built in Erie (middle photo). This foundry remained in operation until the late 1920's. In 1924 the former plant of the American Brakeshoe Company was bought from the federal government (bottom photo). This plant was the home of the Jarecki Manufacturing Company until it became a division of H. K. Porter Company.

The Oil Industry's

100 YEARS

A Division of
H. K. PORTER COMPANY, INC.

1852- 1952

It was 1852, seven years before Colonel Drake discovered the first producing oil well in America, that Jarecki was founded. In 1867 Jarecki opened their first oil well supply store in Pithole, Pennsylvania.

One hundred years later, in March, 1952, Jarecki opened their newest supply store at Rule, Haskell County, Texas. Through the entire life of the oil industry Jarecki has continuously served the needs of this great industry.

FIRST *Source of Supply*

We can't imagine what the next hundred years will bring in the way of new equipment and supply store services. But this we do know: as changes occur in the future, as they have in the past, the Jarecki International organization will continue to bring you the best service and the best products on the market.

One hundred years experience is at your command. Call your nearest J-I store.

JARECKI INTERNATIONAL SUPPLY DIVISION

H. K. PORTER COMPANY, INC.

General Sales Office Dallas 1, Texas Atlantic Building

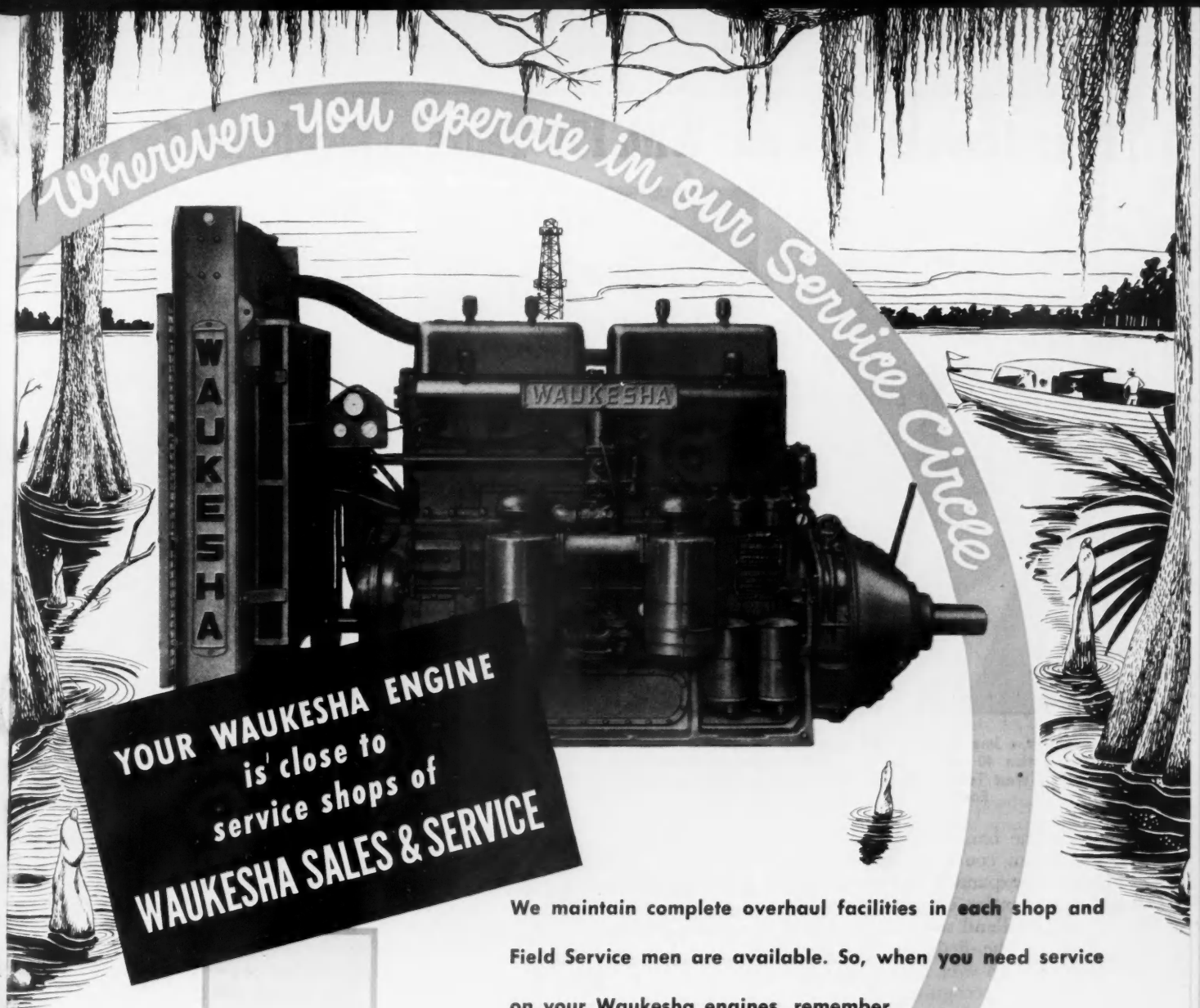
OTHER H. K. PORTER COMPANY, INC., DIVISIONS SERVING DIVERSIFIED INDUSTRIES:
American-Fort Pitt Spring Division; Hinderliter Tool Company Division; Buffalo Steel Division; Connors Steel Company; Delta-Star Electric Company; Quaker Rubber Corporation

Charles L. White (left) is general manager of Jarecki International Supply Division of H. K. Porter Company. He joined Jarecki in 1949.

Frank E. Swain (above) is assistant to general manager of Jarecki International. He was with IDECO Supply Division before joining Jarecki in 1951.

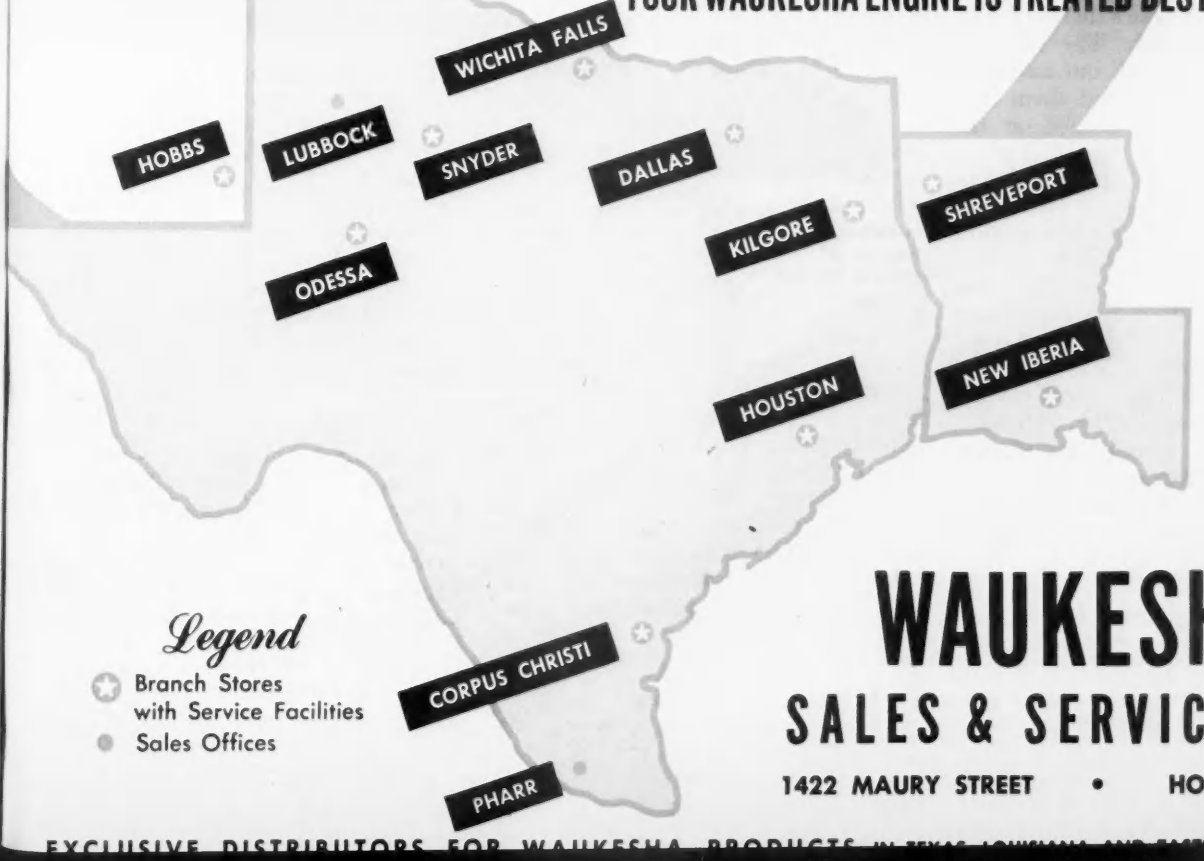
F. E. Suder (above) is Jarecki International sales manager. He had a long and varied career in the oil field supply industry before joining Jarecki in 1951.

Right is a scene in the offices of Jarecki International in the Atlantic Building in Dallas. From the Dallas headquarters, 15 supply stores are operated in six states.



We maintain complete overhaul facilities in each shop and Field Service men are available. So, when you need service on your Waukesha engines, remember

YOUR WAUKESHA ENGINE IS TREATED BEST AT HOME!



Legend

- Branch Stores with Service Facilities
- Sales Offices

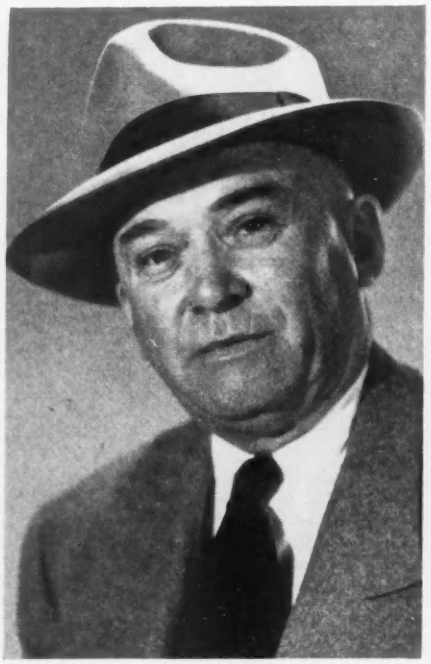
WAUKESHA
SALES & SERVICE, INC.

1422 MAURY STREET • HOUSTON, TEXAS

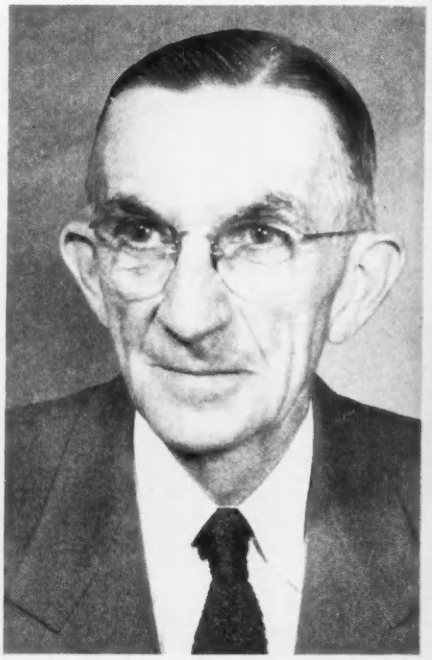
EXCLUSIVE DISTRIBUTORS FOR WAUKESHA PRODUCTS IN TEXAS, LOUISIANA AND EASTERN NEW MEXICO

Four Jarecki Veterans With 150 Years of Combined Service

Carl Angstadt, a Jarecki veteran, has been with the organization 40 years. He's now district manager for West Texas with headquarters in Eastland.



C. O. Carpenter, now a Jarecki International salesman out of the Oklahoma City office, has been with the firm 40 years.



J. F. Conley, who has worked for Jarecki for 37 years, is now manager of the Jarecki International supply store in Wichita Falls, Texas.

built on the bank of Mill Creek, a small stream coursing through Erie. This plant expanded until it covered almost an entire city block on 9th, 10th and Holland streets in Erie.

Then as the fledgling oil empire spread over an ever expanding area, the Jareckis recognized a pressing need of that early era. Getting supplies to the snowballing industry.

New areas were being explored by the oil pioneers. Drake's discovery had touched off the rush. The oil men needed supplies to seek out and produce oil and they needed them fast. These supplies were needed at the scene of the activity.

To meet this need Jarecki established at Pithole, Penn., in 1867 what some believe to have been the world's first oil well supply store. Another store opened at Clarendon, Penn., was in operation until a few years ago and the building still stands. As new oil fields were discovered Jarecki spread its supply lines and opened new stores in western Pennsylvania, Ohio, Indiana, Illinois and finally Oklahoma and Texas.

The plant on Mill Creek that had succeeded the little machine shop on State Street was soon too small to handle the increased volume of business. In 1889 an iron foundry was built at 12th and Chestnut streets in Erie which remained in operation until the late 1920's. In 1924 a large plant, originally that of the American

E. C. (Blondie) Munnell, now a city salesman in Dallas, has been with the Jarecki organization for 33 years. Munnell spent 21 of these years in the same office in the Magnolia Building in Dallas.

Brakeshoe Company and later the Erie Howitzer Company plant, was bought from the federal government. This was one of the largest munition plants during World War I, consisting of three buildings. One alone covered more than 100,000 square feet of floor space—a big step from the 18-by-100 building on State Street. This new plant was the home of the Jarecki Manufacturing Company until it became a division of H. K. Porter.

Another First

To its long list of firsts, Jarecki can add another. The company was among the first in the U. S. to use natural gas commercially. In the early days of the company, employes drilled a well on the foundry lot in Erie. For years that well served as a source of light and power for the plant.

And among the first to use natural gas for domestic purposes was Alex Jarecki, one-time president of the company. His country home was heated by gas from a well drilled before 1884.

Jarecki was recognized as one of the world's largest makers of cast iron, malleable iron, semi-steel and brass fittings, valves and specialty fittings. The big plant at Erie at one time carried in stock approximately 7000 different valves, fittings and specialties.

Jarecki also was acclaimed for a policy of testing valves beyond their working pressure rating, assuring a bonus of strength and service.

Family Organization

From its beginning 100 years ago until it became a part of the H. K. Porter group of industries, Jarecki was a family organization. Henry Jarecki served as chairman of the company until his death in 1884. Charles Jarecki, Henry's brother and co-founder, became chairman in 1884. On Oct. 27, 1877, the organization became Jarecki Manufacturing Company, Limited, a partnership. On

CONGRATULATIONS JARECKI INTERNATIONAL

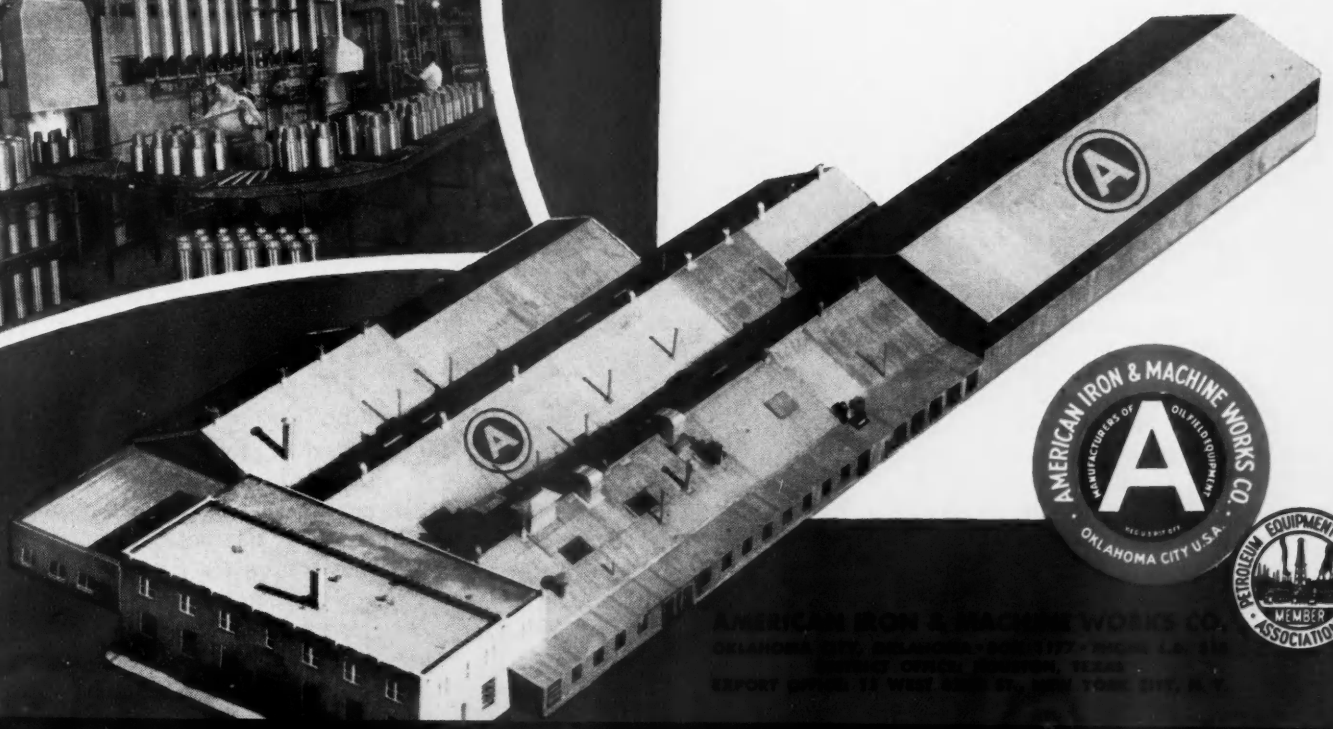
100 YEARS 1852 1952

We fully appreciate the tremendous concentration of effort that must be expanded on both quality of product and service, if any company is to succeed for long in this great industry! To succeed for 100 years is an enviable record—and a tribute to the American way of free enterprise.

For more than 28 years, American Iron has also been constantly developing both products and service, as evidenced by these views of some of our plant facilities.

Here is American Iron Plant No. 1, both technical and manufacturing headquarters for our outstanding line of oil field equipment. Housed in this plant is American Iron's modern tool joint production line —plus complete machining and heat treating facilities for all American Iron Products.

American Iron Plant No. 2, covering 7½ acres, provides sufficient storage racks for the handling of 1,000,000 feet of pipe. Complete facilities are available for the installation of all types of rotary tool joints to drill pipe.



AMERICAN IRON & MACHINE WORKS CO. MANUFACTURERS OF OIL FIELD EQUIPMENT OKLAHOMA CITY U.S.A.

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER

T. M. EVANS
President, H. K. Porter Company

Porter President Says...

We take great pride in the fact that our Jarecki International Supply Division has served the oil industry from its very beginning, expanding and moving to new areas as demands for Jarecki products and services dictate.

The company has followed the basic principle of locating stores in the most active drilling areas. At the present time our stores serve areas in which more than 67 percent of the total drilling activity in the country is taking place.

For the future we hope to continue to follow this set policy so that our customers will receive the benefit of our experience and knowledge gained in 100 years of service to the oil and gas industry.

July 31, 1897 it became Jarecki Manufacturing Company, a corporation. Charles Jarecki served as head of the company until his death in 1901.

Albert Jarecki, Henry's son, then became president and was succeeded in 1915 by Alex Jarecki, Charles' son. When Alex died in April, 1941, Robert Jarecki, a brother, took over the reins of the organization. He served until Jarecki became a division of H. K. Porter on July 15, 1949.

Shortly after H. K. Porter took over, Jarecki became strictly a supply organization. The name Jarecki Manufacturing Company was retained until March 2, 1951, when H. K Porter bought the IDECO supply stores. These were incorporated into the Jarecki organization and the name was changed to Jarecki International Supply Division of H. K. Porter Company, Inc.

Continuing Challenge

Now, as one of the seven Porter industries and starting on its second century, Jarecki International faces the continuing challenge of supplying the still growing oil industry. Last year crude production was at a record high. Estimates for this year run as high as 2,319,000,000 barrels. In striving to meet these increased demands, the Jarecki International Supply Division has the support of the whole H. K. Porter Company.

The growth of H. K. Porter is itself an amazing saga. The company was founded in 1866 to manufacture locomotives but has far outgrown its original purpose. It is now the parent company of a diversified and expanding family of industries engaged in the manufacture and distribution of many basic industrial products.

In his 1951 report to stockholders and employes, T. M. Evans, president of H. K Porter, said: "In the period from 1940 to the present the company had a remarkable growth from sales of less than $50,000 per month to the current volume of more than $4 million per month, an increase in net worth of its common stockholder's equity from less than $100,000 to the current figure of more than $11 million. The original Porter plant was a small three-story frame building employing a handful of men. Today the Porter manufacturing plants have floor space totaling 675,000 square feet and occupy more than 50 acres of ground. Employes of the company number more than 3000."

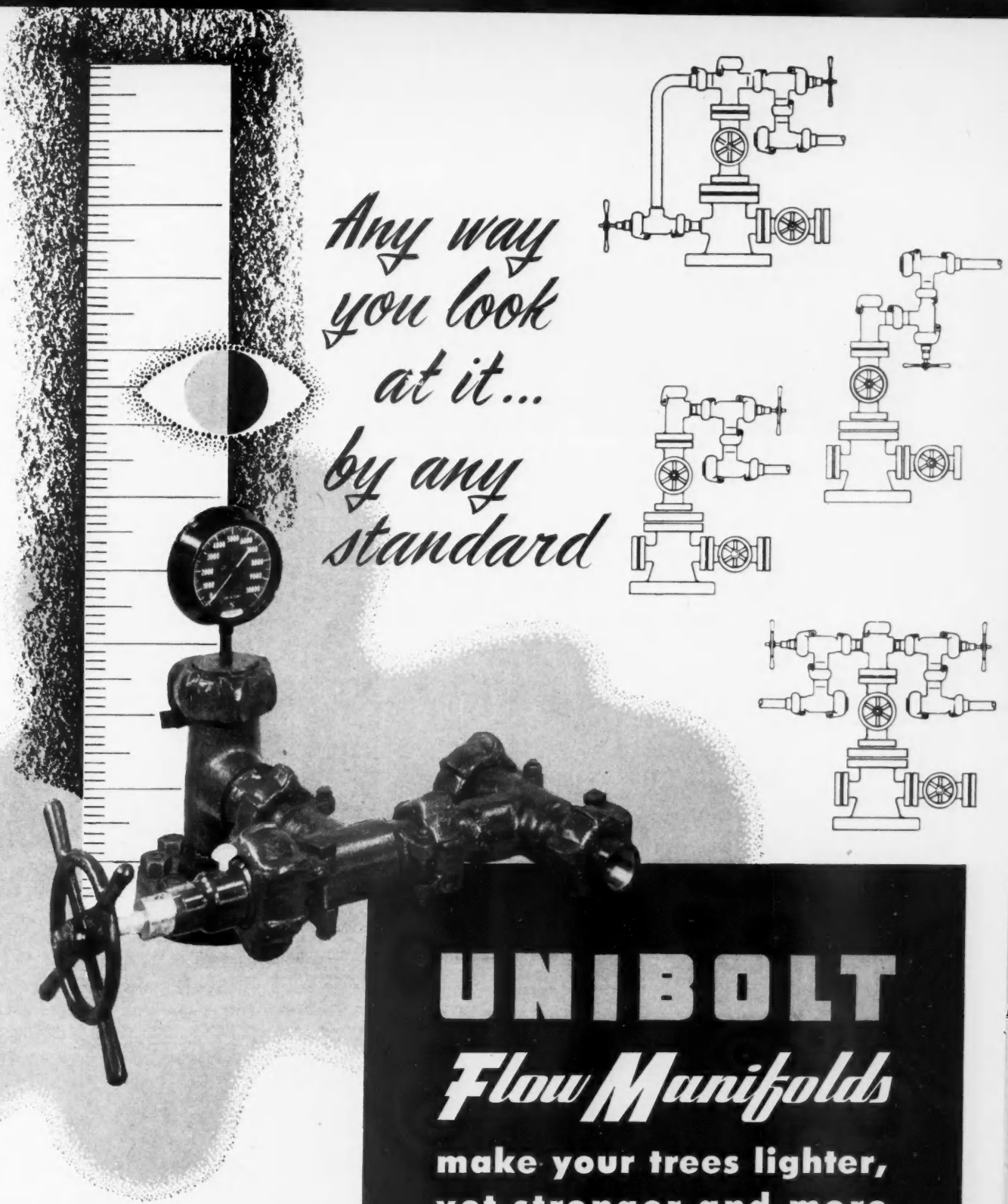
C. R. Dobson is executive vice president of H. K. Porter Company.

Porter Divisions

Besides Jarecki International, the divisions of the H. K. Porter Company today are:

- American-Fort Pitt Spring Division, McKees Rocks, Penn.
- Hinderliter Tool Company Division, Tulsa.
- Connors Steel Company Division, Birmingham.
- Delta-Star Electric Company, Chicago.
- Quaker Rubber Corporation, Philadelphia.
- Buffalo Steel Division, Buffalo.

President Evans points out that while the growth of H. K. Porter has been rapid and spectacular in some respects, it has not been haphazard. It has followed a definite pattern or diversification in fields that offered



Any way you look at it... by any standard

UNIBOLT

Flow Manifolds

make your trees lighter, yet stronger and more economical

Ask your Christmas tree supplier to furnish UNIBOLT Flow Manifolds (everything above the master valve). These compact, completely salvageable manifolds, consisting of a Tee or Cross, Adjustable Wing Valve, and Positive Choke Body, are pressure-tested as a unit and may be assembled in a number of combinations to best meet individual needs.

Employing standard UNIBOLT connections rather than flanges, the UNIBOLT Flow Manifold is many pounds lighter, yet the UNIBOLT design, which places more metal in shear, actually results in a higher factor of safety for the manifold.

Furnished in regular forged steel or in high-chrome alloy for corrosive wells — 6000, 10,000 and 15,000 lbs. test.

THORNHILL-CRAVER COMPANY

P. O. BOX 1184 HOUSTON, TEXAS

UNIBOLT
THE ONE BOLT COUPLING

Above is a scene during the boom days at Mexia, Texas, with the Jarecki Manufacturing Company supply store in the background.

Above is the present day Jarecki International supply store in Houston.

promising possibilities for the future. It was this policy that led H. K. Porter into the oil field supply business. Evans further explains that while H. K. Porter already has achieved substantial diversification and growth, it is the aim to continue the growth of the company, not only through expansion of present facilities but through the acquisition of additional businesses in promising fields.

Recent expansion programs have been carried out at four of the company's plants: Hinderliter Tool Company, Quaker Rubber Corporation, Connors Steel Company and Delta-Star Electric Company. Approximately $3 million in capital funds went into these projects.

Offices In Dallas

Besides Evans, officers of H. K. Porter are C. R. Dobson, executive vice president; J. C. Leslie, treasurer, and F. A. Rehorst, secretary.

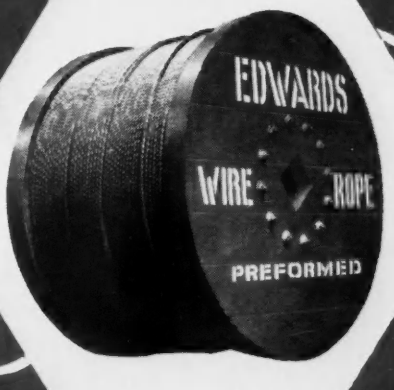
Headquarters for the Jarecki International Supply Division is in the Atlantic Building in Dallas, from where 15 supply stores are operated in six states. Jarecki International supply stores are in Great Bend, Kansas, Hobbs, N. M., Natchez, Miss., Shreveport, La., Seminole, Okla., and Oklahoma City. Texas stores are in Eastland, Graham, Houston, Kilgore, Odessa, Rule, Snyder, Wichita Falls and Winters. Sales offices are in Dallas, Fort Worth and Midland in Texas and Tulsa in Oklahoma.

Directing Jarecki International activities as general manager is Charles

Jarecki International supply stores serve an area where more than two-thirds of the total drilling activity in the U. S. is taking place. Above is the store at Odessa, Texas.

100 years of service to the Petroleum Industry

A Division of
H. K. PORTER COMPANY, INC.



We congratulate the Jarecki International organization on completing a full century of successful operation. This enviable record tells its own story of dependable service and quality products. Your Jarecki Representative will welcome an opportunity to point out the many reasons why Edwards Wire Rope was selected for distribution by his company.

EDWARDS WIRE ROPE

E. H. EDWARDS COMPANY

General Office
SOUTH SAN FRANCISCO, CALIF.
Houston • Los Angeles
Seattle • Portland

L. White, who joined Jarecki in 1949.

Frank E. Swain is assistant to general manager of Jarecki International. He joined IDECO at Columbus, Ohio, in 1932. He was with the IDECO Supply Division before assuming his present position with Jarecki International in 1951.

F. E. Suder, Jarecki International sales manager, has had a long and varied career in the oil field supply industry. In 1917 and 1918 he was sales manager of Lidecker Tool Company. From 1919 to 1923 he held the same position with Creebecker Oil Tool Company. In 1923 he became purchasing agent and later traffic manager of Bridgeport Machine Company, in Wichita, Kansas. In 1927 he was named district manager of machinery sales of National Supply Company.

He held this position until 1930, when he was made manager of unit sales for IDECO. He was with IDECO until 1951, when he joined Jarecki International as sales manager.

Faces Second Century

So with 100 years of service behind it, Jarecki International is facing the second 100 years with the same type of optimism and enthusiasm that characterized its founding back in Erie.

Jarecki International—and other supply companies — have just gone through the critical period of World War II and the readjustment that followed. To the supply men fell the task of weeding out the wartime improvisations and turning to the tools of progress in the oil industry. Wartime service was nothing new to Jarecki. The company has four service stripes on its sleeve. The Civil War, Spanish-American War, World War I, and World War II. Jarecki served well and proudly through these conflicts.

Now record-breaking forecasts are being made for the oil industry. World Oil has forecast the drilling of 45,967 wells in the U. S. during 1952, an increase of 2.5 percent and 1141 wells over the record-breaking number completed in 1951. And the future of the oil field supply industry obviously is linked with the future of the oil industry. It is an industry within an industry.

If the oil industry is to reach its goals, the petroleum supply industry must come through with a pace-setting performance. It must supply the answers as to how the oil men will meet the accelerated pace of drilling and production. Following the example set by the Jarecki founders, supply men must be ready to distribute equipment designed to meet every need in the field.

Jarecki International Supply Division, under the direction of the H. K. Porter Company, is not resting on laurels garnered in bygone days. It is looking to the future with supply stores now serving the areas in which a total of more than two-thirds of the total drilling activity in the U. S. is taking place. Jarecki International looks forward to a future of service to the oil industry—service through its supply stores and trained supply men, who study local conditions and make it their business to be of service to Jarecki International customers.

There is a difference in needle valves and O·C·T makes the difference!

O-C-T Needle Valve bodies are single piece drop forged steel. The male thread is made as an integral part of the valve which gives you a more compact, stronger connection. This one-piece O-C-T Needle Valve design eliminates the use of nipples and minimizes the chances for leakage. Buy O-C-T Needle Valves from your supply store. There is a difference . . . and O-C-T makes the difference!

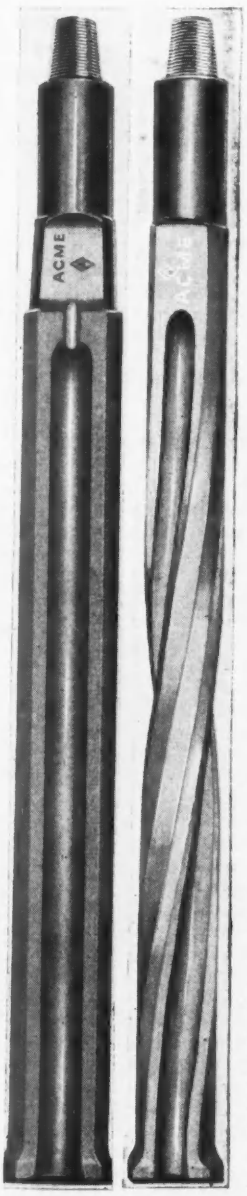
Oil Center Tool Co. P. O. Box 3091 Houston, Texas

Export Representatives: Sterling Areas—Le Grand, Sutcliff & Gell, Ltd., Rochester, Kent, England. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston 1, Texas.

Better Tools Mean More Oil

Hundreds of products developed during the past two years are described and illustrated on the following pages. These new and improved tools result from the cooperative effort of manufacturers and service companies with the oil industry to achieve better methods of finding and producing petroleum. The descriptions are grouped alphabetically, by companies.

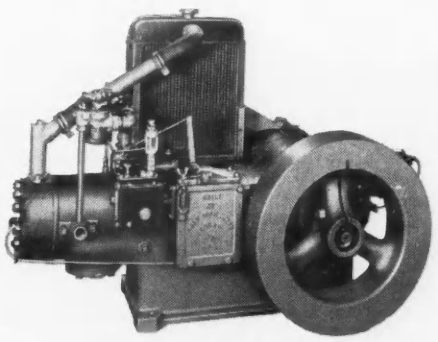
Acme Fishing Tool Company



The Acme Alloy Bit, identified by the Diamond "A" on the square, is available in both straight and twisted designs for rugged cable tool drilling service. The new bits are available in the same sizes and styles as Acme's "regular" carbon steel bits, and can be field dressed with similar equipment, provided the recommended procedure as outlined in Acme's Temperature Color Chart is observed. Hard-steel construction of the "Big Chief" Alloy Bit enable it to withstand hardest, grittiest formations, the company claims. Field tests, according to Acme Engineers, have shown the bit to be strong and tough enough to resist the severe abrasive action of the sharpest sands, and also that the new bit will provide 50 percent more down hole drilling time than earlier bits of softer steel.

Circle No. 1 on Postcard, Page 303

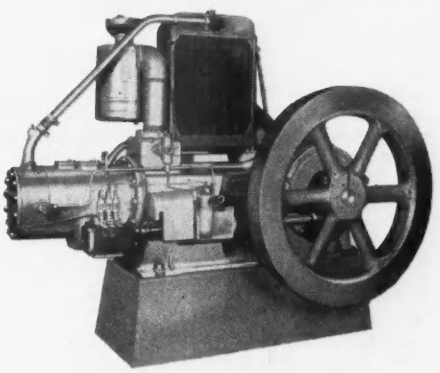
Ajax Iron Works



The Ajax 5 x 6-inch Gas Engine, a new oil well pumping unit in the 5 to 12 horsepower range, is specifically designed for pumping light loads. The compact engine has been designated Model WL, referring to its wet-type cylinder liner which can be replaced in the field and eliminates oversize pistons and rings. Recommended speed range is 400 to 900 revolutions per minute, with a flat torque maintained over the wide range. Compression ratio is 5.6 to 1. The Model WL has thermo-syphon cooling, waterproof ignition and controlled cylinder lubrication. The only gears in the engine are those between the crankshaft and the layshaft.

Circle No. 2 on Postcard, Page 303

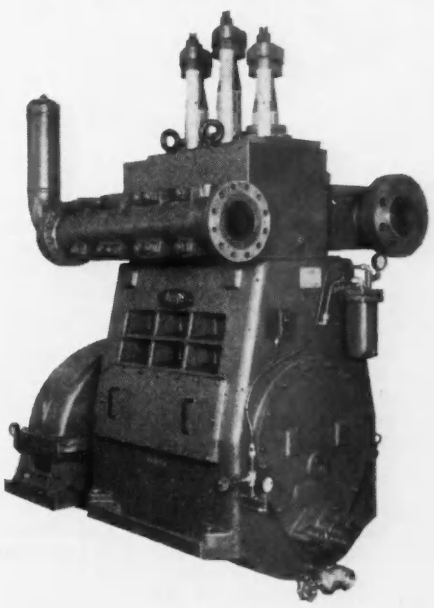
The Ajax 11 x 14-inch CMD Gas Engine, for heavy-duty oil well pumping, is a single cylinder, two-cycle, horizontal, crosshead type model. Speed range has been extended from 200 to 400 revolutions per minute for greater flexibility of operation. Flywheel has been redesigned with a massive rim section for smooth flow of power. The engine has direct drive rotary lubricator, rotary magneto and power take-off type clutch. There is also thermo-syphon cooling system with automatic control. Gas injection system is optional. The engine can be converted to oil.



Circle No. 3 on Postcard, Page 303

The Aldrich Pump Company

Six-inch Stroke Direct Flow Pumps—3, 5, 7 and 9 plunger units, ranging from 300 to 900 horsepower—extend the Aldrich line of three- and five-inch stroke direct flow pumps. The six-inch stroke pumps can operate at speeds up to 300 revolutions per minute, are suitable for direct drive by engine or synchronous engine-type motor. The fluid-end is sectionalized. Parts can be made of stainless, bronze, Monel or other material. Maintenance is simplified, as there are no tapered bores in the working barrel to make valve removal difficult. Manifolds slide out on studs, and valves can be lifted out as complete units. Plungers can be readily changed to meet alterations in pressure or capacity. Pumps are used for water flooding, salt water disposal, crude and gathering lines, product lines, and pumping hydrocarbon liquids.

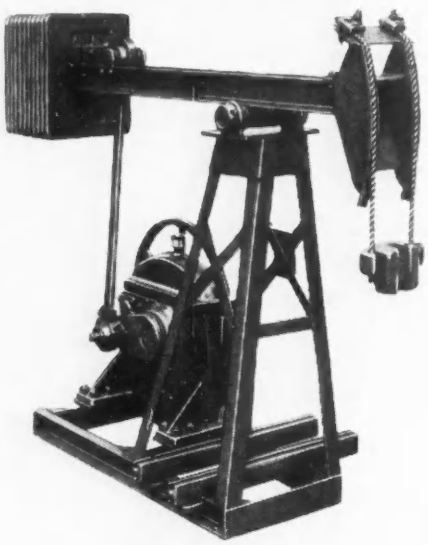


Circle No. 4 on Postcard, Page 303

Alten Foundry & Machine Works

Alten A-20 and A-33 Pumping Units are designed for shallow wells and/or water wells. They have heavy structural steel construction with precision cut and

A-33



A-20

shaved alloy steel gears that are specially flame hardened; anti-friction bearings; electric motor mount optional under Samson post for compactness. Both units feature an improved adaptation of single Pitman design which prevents overload by bringing bearing and Pitman into alignment. The cable hanger allows quick, easy field changes and adjustments. They are adjustable to any stroke length to 14 inches.

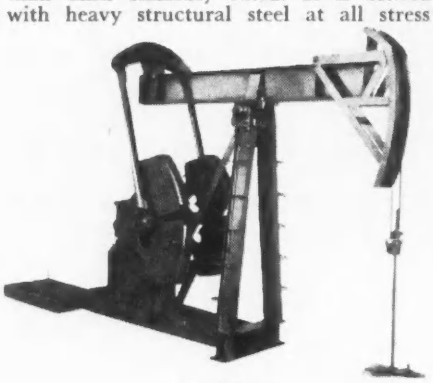
Circle No. 5 on Postcard, Page 303

Alten Wonbolt Polished Rod Clamp gives strong, vise-like grip with only one nut to secure. It is completely self-aligning and will not deface or distort the polished rod. The extra long, cadmium-plated weatherproof nut gives added wrenching surface. It is available in two sizes: the

five-pound Junior model which holds more than 20,000 pounds, and the 12-pound Senior model which holds more than 35,000 pounds.

Circle No. 6 on Postcard, Page 303

The Alten A-120 Unit for medium to deep wells is claimed to give longer strokes and higher gear reducer ratings than units similarly rated. It is braced with heavy structural steel at all stress



A-120

points and is rated at 12,000 pounds with adjustable stroke length to 44 inches. The unit has adjustable saddle bearings and self-aligning wrist pin roller bearings. Floor clearing design, rotary counterbalance and full weatherproof construction are optional. The pump utilizes single helical gears that are precision cut and shaved from forged alloy steel. Gear surfaces are flame hardened. Torque rated at 70,000 inch pounds, the unit easily pumps full rated capacity.

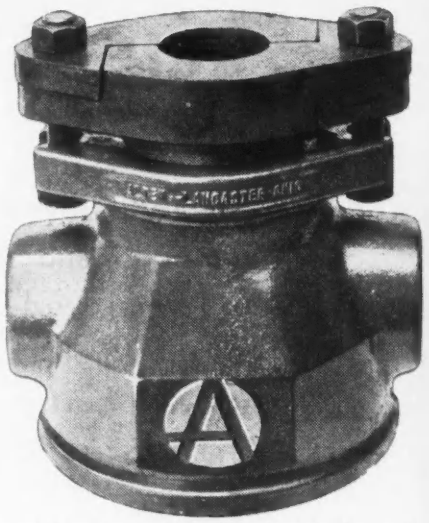
Circle No. 7 on Postcard, Page 303

Alten Universal Tubing Head (Berry Type) is a versatile, medium pressure head designed for use with Berry type flange attachments. All parts clamp together so that the well may be prepared for "pull through" operations by merely loosening two bolts and removing adapters. No tongs or torque wrenches are necessary to dismantle it. The tubing head

converts easily from flowing to gas lift to pumping wells. It is made of high tensile cast steel with full openings for tools and swabs, and has blowout preventer and oil saver for running tubing. It is available in a full range of sizes.

Circle No. 8 on Postcard, Page 303

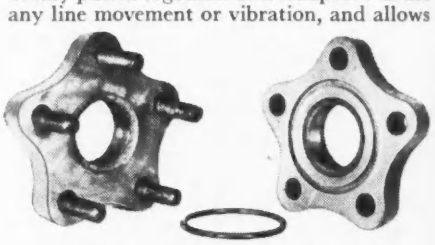
Alten Stubby Tubing Head is a multi-purpose head which combines qualities of several heads of different types. It is built squattily to bring wellhead equipment down low, and is offered in both threaded



and slipover models. The Stubby is available as split or solid gland, either interchangeable; and packs on tubing or coupling. It is furnished with two side outlets for regular or upset two-inch tubing in a wide number of sizes.

Circle No. 9 on Postcard, Page 303

Alten Flange Union with O-ring gives a complete seal on contact even when unevenly pulled together. It is leakproof under any line movement or vibration, and allows



more pipe line contraction and expansion than lead gaskets, the manufacturer claims. Tests show the ring withstands constant or variable fluid pressures up to 5000 pounds and resists oil, sludge or acids.

Circle No. 10 on Postcard, Page 303

American-LaFrance-Foamite Corporation

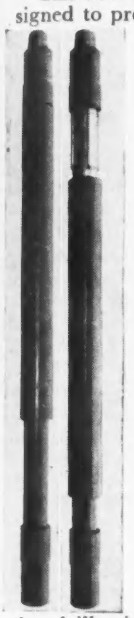
The Alfco Pressurized Fire Gun is a lightweight one quart unit designed for hand operation in fighting Class B and C fires. The air expelled fluid (pressurized between 125 to 175 pounds per square inch at 70° F. Chamber bursting strength —900 psi) is released with a trigger mechanism permitting one hand operation and accuracy in fluid guidance. This unit will withstand normal vibrations and jars commonly encountered on motor vehicles. All movable parts can be serviced. Its effective range is

25 to 30 feet at 70° F. for the bulk of the liquid and the discharge time is 35 seconds at a comparable temperature. Efficient operation can be expected in temperatures down to 40° F. The possibility of overfilling the extinguisher is eliminated by use of the liquid level tube.

Circle No. 11 on Postcard, Page 303

A-1 Bit & Tool Company

The A-1 Burris Key Seat Wiper is designed to prevent sticking drill pipe in key seats on coming out of the hole. It is a drill collar assembly consisting of two bumper subs, a mandrel, and a slip-jar sleeve. The steel sleeve is of a slightly larger outside diameter than the drill collar, but kept small enough to permit successful washovers. It is impregnated with tungsten carbide hard metal to maintain the constant o.d. and prevent wear. It is positioned just above the drill collar. On coming out of the hole, the sleeve contacts all key seats first. The square, sharp shoulder of the sleeve actually cuts into the key seats, wiping them to a passable o.d. When a key seat is small enough to stick the sleeve, jarring action may be applied in both directions by slacking off and taking up the drill pipe. This wipes the key seat out and permits easy retraction of the drill stem.



Circle No. 12 on Postcard, Page 303

N-35 Core Barrel

Sure-Shot

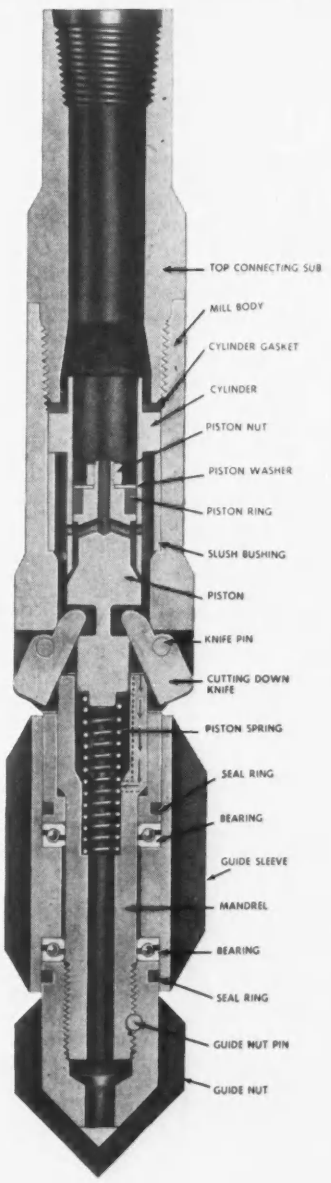
The N-35 Rotary Side Wall Core Barrel, a reduced replica of a standard A-1 Rotary-Type Side Wall Core Barrel, is designed for operation in open holes as small as six inches in diameter, such as are frequently encountered in West Texas. The tool will cut a core from any specified depth without compressing or contaminating the core. It is designed to take cores with enough length for complete analytical tests. In operation thus far it has taken cores that have averaged 5.3 inches long with one-inch diameter.

Circle No. 13 on Postcard, Page 303

The Sure Shot Deviation Recording Instrument uses a simple plumb bob to measure the angle slope of well bore. A sharp steel needle is positioned in the nose of the plumb bob. The plumb bob is suspended from a piston and hangs over an aluminum recording disc. The piston is spring-loaded and trigger set to a timing mechanism. Prior to dropping the Sure Shot in the hole or running it in on a line, the timing mechanism is set to allow three minutes beyond the time it takes the tool to reach bottom. When this time is up, the trigger releases the spring-loaded piston causing the plumb bob to travel down 1/16 of an inch, puncturing the aluminum disc. This gives a permanent and accurate record of the angle slope of the well bore. The tool contains no delicate instruments and it operates within a steel protective case. Heavy spring shock absorbers at each end inside the case protect the tool from the impact shock of gravity falling.

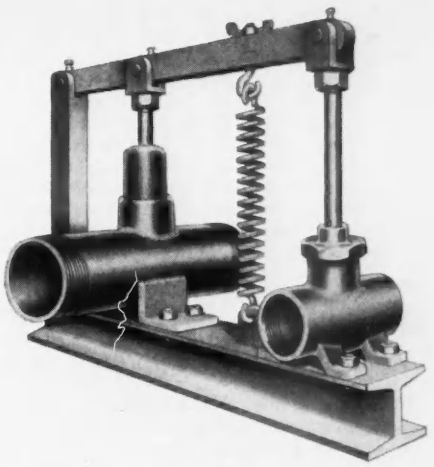
Circle No. 14 on Postcard, Page 303

The Eccentric Guide Casing Mill is claimed to give 100 percent increase in milling rates over old methods. It is an expanding type of casing mill with much longer and heavier knives than previously used. It has a guide rib in the body of the mill which actually throws the path of rotation off-center or eccentric. This action causes the knives to out with a sawing action, getting full use of the cutting edge of each knife.



Circle No. 15 on Postcard, Page 303

The A-1 Gardner Water Control Valve is designed to shut off water to the mud tank or mud pit automatically during temporary shut downs, frequently encountered while coring or making connections. Often during emergencies crews forget or become too busy to out the mud-water off, thus diluting costly mud. Connecting to the mud and water lines at the same time, this valve opens only when the mud pressure forces it open. Whenever the mud pressure drops below normal operating pressure, spring tension closes the gates on both the water line and mud line. If for any reason it is desired to keep the lines open constantly, the valve can be locked in the open position.



Circle No. 16 on Postcard, Page 303

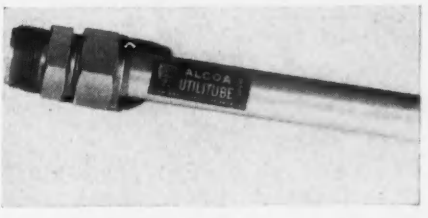
American Sand-Banum Company, Inc.

Pro-Tex-It is a dual purpose, non-toxic product for corrosion control and rugged lubrication problems. It has largely eliminated destructive action of heavy muriatic-sulfuric acid solutions and lengthened the life of fittings, piping and equipment. Corrosion tests indicate that when applied to aluminum, the sample will withstand 500 hour exposure to salt fog. Eliminates corrosion in pumps, pipings and tanks subject to moisture masters corrosion on magnetic regulator pins. Some of the lubrication fields include wheel bearings, gears, conveyor return wheels subject to temperatures of 650° F.; water regulating valves, etc. It keeps packings soft in connection with cyanide and other acids. It has a temperature range effectiveness of —75° F. to more than +500° F. It can be brushed, rubbed or sprayed on.

Circle No. 17 on Postcard, Page 303

Aluminum Company of America

Utilitube is an aluminum coiled tube in new alloy B50S-O which combines many of the advantages of 3S and 4S, particularly easy workability and high fatigue strength. It is produced in lengths up to 1000 feet or more in some sizes on specially designed equipment. Utilitube is being offered as a general purpose coiled tube for such uses as gasoline, fuel oil and lubricating oil lines for internal combustion engines. Standard aluminum couplings may be used with the new tubing.



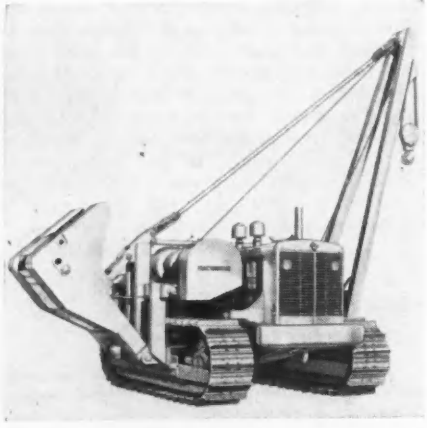
Circle No. 18 on Postcard, Page 303

Aluminum Pipe has been developed by Alcoa for use as temporary water supply in oil fields. It is so light that one man can carry two or more 20-foot lengths of four-inch pipe (each length weighs only 14.6 pounds). Quick-latching flexible couplings made by various fitting manufacturers can be attached to ends of pipe sections to join the lengths of pipe. Being flexible, the couplings allow the pipe to conform to sloping or rolling ground.

Circle No. 19 on Postcard, Page 303

Allis-Chalmers Manufacturing Company

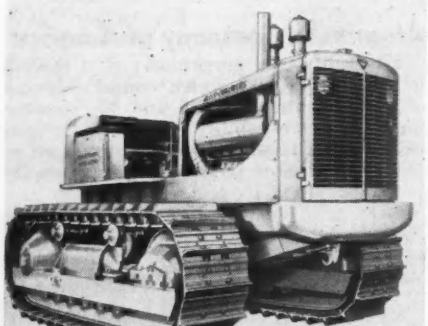
Allis-Chalmers HD-15 diesel-powered crawler tractor has a Tractomotive side boom for pipe line construction work. This type of side boom is also available for the Allis-Chalmers HD-20 crawler tractor, the



largest in the line. The HD-15 has a drawbar horsepower of 109, and the drawbar pulls range from 29,400 pounds in first gear to 5840 pounds in sixth gear. It has three reverse speeds, and hydraulic steering. It weighs 27,850 pounds without side boom.

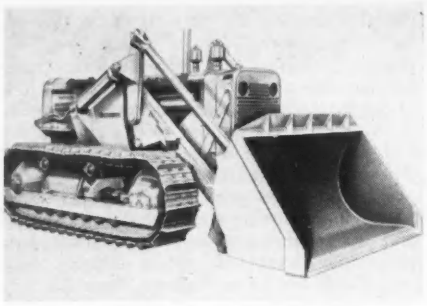
Circle No. 20 on Postcard, Page 303

Allis-Chalmers Model HD-20 diesel-powered crawler tractor with hydraulic torque converter drive is the largest crawler tractor in this line. It has a 175 net engine horsepower at the flywheel with 65,000 pounds maximum drawbar pull in



low gear and 32,000 pounds in high gear. It weighs approximately 41,000 pounds. Speed range is from 3 miles per hour in low gear to 7 mph in high. Steering is hydraulically controlled through the steering clutches. A full line of allied equipment is available.

Circle No. 21 on Postcard, Page 303



Tracto-Shovel manufactured by Tractomotive Corporation is added to this Allis-Chalmers Model HD-20 diesel-powered crawler tractor. The shovel has a capacity of four cubic yards with a dumping height of 13 feet, five inches. This hydraulic shovel has a wide range of utility, which can be augmented by a number of quick-change attachments, such as bulldozer blades.

Circle No. 22 on Postcard, Page 303

The Allis-Chalmers HD-9X with Baker bulldozer is hydraulically controlled and has a new type lifting mechanism. Heavy stabilizer bars from moldboard to truck frame absorb torsional strain. Cyclinders connect to stabilizer bars through spherical bearings. Stabilizer bar in turn connects to truck frame through link which permits only relatively vertical forces to be transmitted thereto. Entire weight of tractor front-end and dozer goes into truck frame

at same location as conventional spring load. The over-all blade width is only 96 inches—the exact width of a standard highway trailer.

Circle No. 23 on Postcard, Page 303

American Chain & Cable Company, Inc.

Wright Safeway Hoists are made in capacities from ½-ton to 4 tons. The simply designed, lightweight hand hoists have gear drive, Weston type brake, steel load chain, steel housing, self-lubrication, and drop forged top and bottom hooks.

Circle No. 24 on Postcard, Page 303

The Wright Safeway Army Type Trolley Hoist is made in capacities from ½ ton to 3 tons and is available with a special load bar and either a pair of two-wheel plain trolleys or one plain and one geared two-wheel trolley. The plain trolley assembly has chilled tread wheels equipped with New Departure ball bearings, steel side plate and connections to load bar. Adjustable for a wide range of beam sizes, and can be changed from plain to geared or vice versa in a few minutes time as both the plain and geared mountings are identical. The geared trolley is constructed the same as the plain trolley type except that the wheels are furnished with gear rings having cut teeth, pinions with cut teeth handwheel, hand chain and hand chain guide. Thrust rollers are mounted to insure proper alignment of the assembly whether on straight or curved track.

Circle No. 25 on Postcard, Page 303

Wright-Way Trolleys are made to use in industrial applications that do not require the high efficiency or high factor of safety of Wright Timken, Hyatt or S.A.R.B. trolleys. Wright-Way trolleys are reasonably efficient, easy rolling units that are safe and durable. They have chilled tread wheels; roller bearings; heavy steel axles; equalizing pin and becket strap; heavy fabricated steel side plates. Wright-Way trolleys have a factor of safety of three to one minimum on all sizes and are plain trolleys built only for standard I-beam sizes.

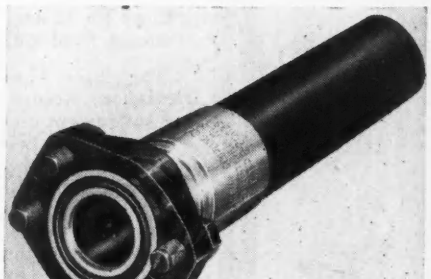
Circle No. 26 on Postcard, Page 303

A New Helicoid Gauge Case for flush mounting gauges on panels is a square case with the same bolt circle and the same round cut-out in the panel as standard round flush cases of the same dial size. The width of the square front flange is considerably less than the diameter of the conventional round front flange. The new square case takes up less room and is particularly suitable for panel installations to match other square case instruments. Available in 4½-, 6- and 8½-inch dial sizes.

Circle No. 27 on Postcard, Page 303

Anchor Coupling Company, Inc.

The Anchor Split-Flange Type Clamp represents an important development for the hydraulic field since the equipment is easy to use, eliminates threaded joints and prevents leaks. A wide selection of sizes is available for use with either clamp or pressed-on type couplings in straight or angle styles for one or two wire braid hose from one-half inch i.d. through two-inch i.d. The clamp is assembled without big pipe wrenches and is designed for high, medium or low pressure service or in suction lines. The seal of this type clamp consists of an O-ring which eliminates a need for tapered threads. There is no wedging action to cause distortion in valve bodies, cylinders or other pieces of

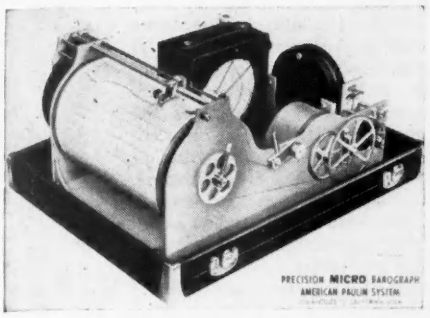


hydraulic apparatus. In design, the bolt centers are located to distribute forces evenly and prevent tilting of the clamp halves. The clamps are structurally strong to withstand pressures of high pressure hose.

Circle No. 28 on Postcard, Page 303

American Paulin System

The Recording Micro Barograph, a surveying instrument for geophysicists and geologists, is constructed on the Nul or Zero-Gauging principle, using the same

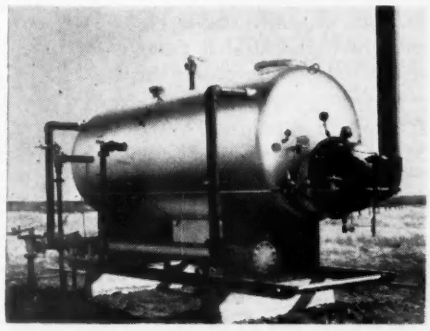


pressure-sensitive device incorporated in all other American Paulin System instruments. All power in the actuating and recording mechanism is supplied by two heavy-duty sealed instrument clocks and no power is taken from the pressure-sensitive device. The Micro Barograph records a pressure curve over a range of ± 1.00 inch mercury and can be used at any elevation from sea level to 10,000 feet. The 24-hour chart is graduated in intervals of 0.005 inch mercury, and chart time is divided into intervals of ten minutes. Curve is drawn on a specially surfaced paper by a metallic point and no ink is used.

Circle No. 29 on Postcard, Page 303

Black, Sivalls & Bryson, Inc.

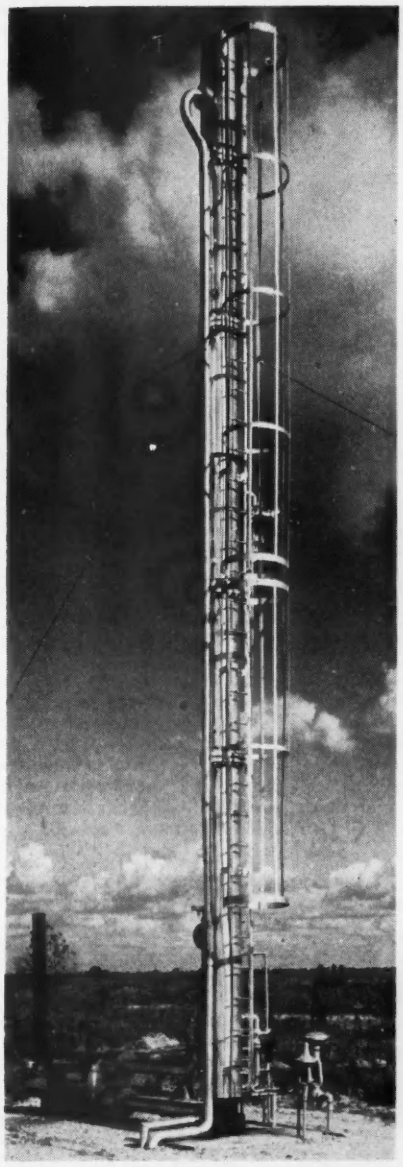
The BS&B Horizontal Emulsion Treater, Model HGT, introduces several innovations in emulsion treating. Use of a steam chest (a closed system requiring no makeup water) for direct heating of oil eliminates heating of wash water, does not impair thermal efficiency of the heating element by deposits on the steam chest, and elimi-



nates the possibility of firebox burnouts. Settling section is maintained at constant temperature, giving better treating results at lower temperature. Lower temperatures and application of minimum heat to water decreases corrosion. Inspection of heating element is unnecessary as long as treating temperatures are maintained. Free water knockout capacity is increased by horizontal travel. Production enters treater above gas-emulsion interface, providing for rapid separation of gas and reduced turbulence. Oil-water and oil-gas interfaces are controlled by weirs. Valves and controls are grouped for easy housing. Minimum field assembly time is required.

Circle No. 30 on Postcard, Page 303

The BS&B Stabilizer, a simplified field stabilization unit, consists of a stabilizer-reboiler package that is designed to increase recovery and minimize waste from lease separation equipment, particularly



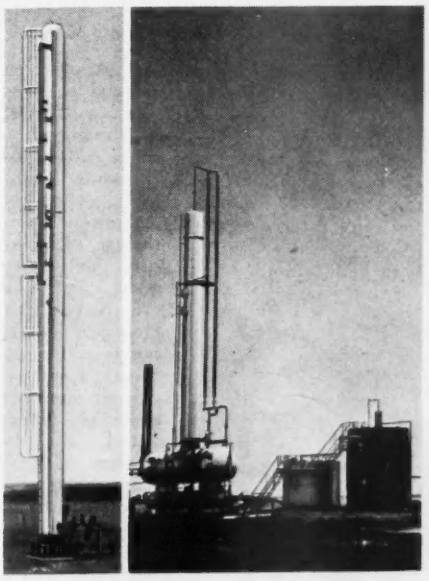
low temperature separation processes. By fractionating propanes and lighter out of the liquids, vapor losses in tanks and pipe lines are practically eliminated. The BS&B Stabilizer will increase yields from most low temperature as well as many normal stage separations to show reasonable payout. Control equipment is simple to operate.

Circle No. 31 on Postcard, Page 303

The BS&B Glycol Injection System is a low temperature separation process with an inhibitor added to prevent hydrate formation and allow full use of refrigeration by expansion. Because temperatures ahead of the choke are well below the normal hydrate formation point, the BS&B Glycol Injection System produces lower separator temperatures and lower dewpoints of the gas stream than conventional low temperature separation units, the manufacturer claims. This brings the high recovery advantages of low temperature separation to lower pressured wells and extends the effective life of existing low temperature separation installations beyond former field pressure decline limitations. Dewpoints 20° to 40° F. below separator temperature can be obtained.

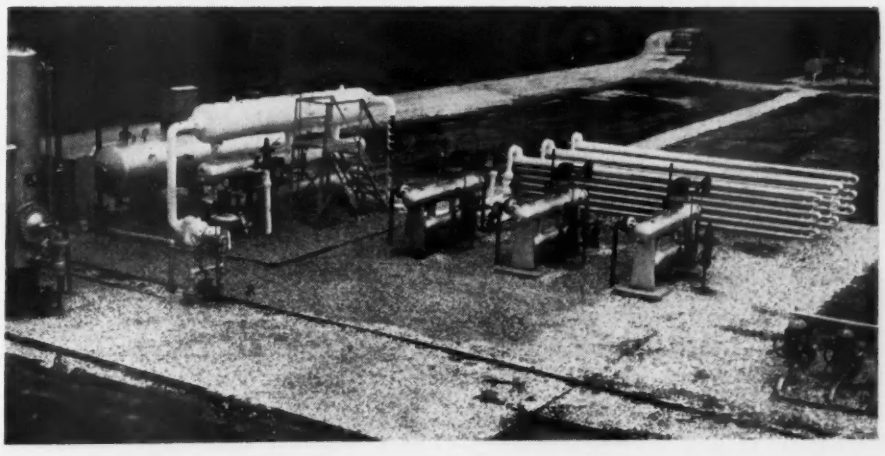
Circle No. 32 on Postcard, Page 303

The BS&B Desulfurizer, an Amine-type plant, is designed to reduce the hydrogen sulfide content of "sour" gas to one grain or less per 100 standard cubic feet, making it suitable for pipe line transmission. The unit consists of a sorber, still column, associated heat exchange equipment, reboiler, storage tank, and gas or electric-powered pump, depending upon available utilities. It is designed for continuous filtering of the desulfurizing solution to reduce corrosion to a minimum. Blowdowns

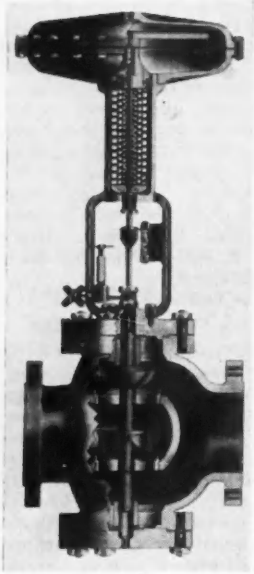


remove sludge and sediment formed during starting up period. Manually-operated bypasses are built around liquid level controls and filter to keep units in operation during cleaning and repair periods. Skid mounting of entire regeneration unit and pre-fabrication of all necessary piping reduces field assembly time.

Circle No. 33 on Postcard, Page 303

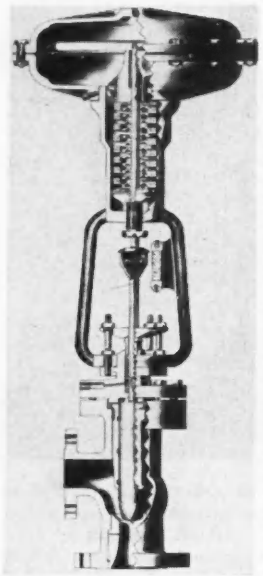


BS&B's Entire Line of Climax Type 86 Diaphragm Control Valves has been redesigned. Single port valves have been designed for single port function; double port valves for double port function; and three-way valves for three-way function. All valve bodies, including three-way, are designed to conform to ISA tentative face-to-face standards. Maximum interchangeability of parts is continued. Type 86 valves are available for all working pressure ranges. Double port sizes range from ½ inch to 16 inches and single port ½ inch to 8 inches.



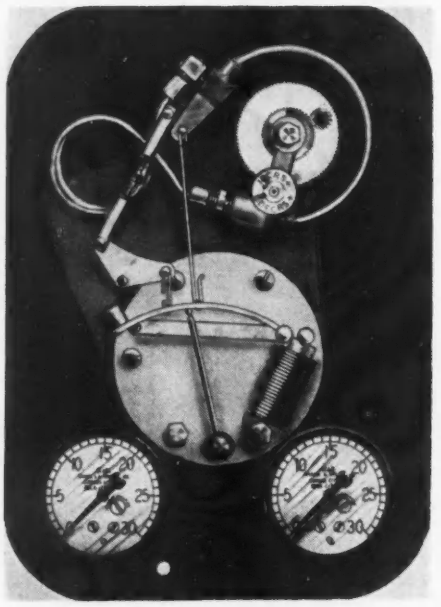
Circle No. 34 on Postcard, Page 303

BS&B Climax Type 115 Angle-type Sweep Flow Valves are designed to provide control of a flowing medium subject to excessive "flashing" or great expansion upon release of pressure. Valve design includes standard ASA flanged angle body connections cast in carbon steel or specified alloys with heat-treated stainless trim of required hardness. Body and trim are designed as a unit with sweep flow inlet leading to a venturi-throated valve seat expanding into the enlarged outlet. This results in minimum turbulence. Available in 2 x 3, 3 x 4, and 4 x 6-inch sizes with standard 150#, 300#, and 600# ASA flanges.

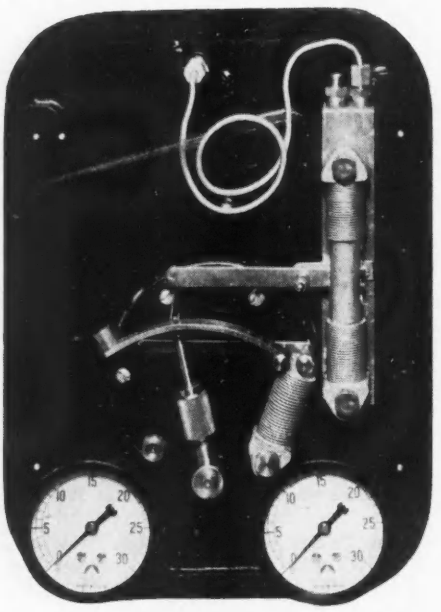


Circle No. 35 on Postcard, Page 303

The BS&B Climax Type 1401 High-Low Pressure Pilot, developed for normal control of reduced pressures on gas flow lines, also provides a "Safety Shutoff" in case of a line break. It also has other applications in pipe line and production operations for control of vacuum, reduced pressure, pump discharge pressure, and maximum-minimum (on-off) control. As a pressure controller it operates up to the limits of its Bourdon tube, but can also be set to close the valve at a pre-set "low pressure" for low pressure cut-off service. It can be used only with a normally closed valve. High pressure setting is obtained by means of the knob adjustment on the Bourdon tube, low pressure by means of a turnbuckle that locks into place.



Circle No. 36 on Postcard, Page 303

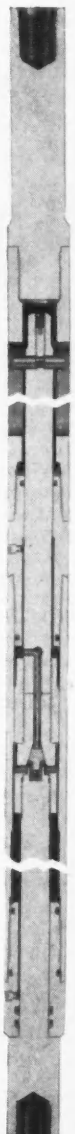


The BS&B Climax Type 1400-LP Pressure Pilot is a bellows-actuated pilot for use in low pressure ranges of 30 inches vacuum to 15 pounds pressure where Bourdon tube-actuated pilots are not satisfactory. It is similar to the Type 1400 Pilot which is used in the control of pressures in the higher ranges.

Circle No. 37 on Postcard, Page 303

Bowen Company of Texas

The Rod Jar is a smaller version of the Bowen-Itco Hydraulic Rotary Jar, incorporating the same principles used in the larger jars, plus a versatility not found in conventional tools of this type. The Rod Jar can be run on either wire line or sucker rod. It can be made to hit any desired blow at the will of the operator. It can be rotated, or by the simple removal of a pin through the washpipe, it can be allowed to swivel. This tool can be used in swabbing operations, bailing, fishing and coring. The tool consists of an outer assembly and inner assembly. The outer assembly contains an oil chamber, within which slides the inner assembly. This oil chamber is sealed off to prevent any possible leakage. About midway of the inner assembly, a piston is provided with a one-way check valve. The check valve permits the piston to enter the restriction in the oil chamber when closing the jars. To strike a blow, a strain is placed on the line or rod, governed by the amount of impact desired. Resulting pull on the jars will cause a transfer of fluid from the space below the piston to the space above the piston. In order to make this transfer, the fluid must pass through a minute annular orifice between the piston and the restriction. This orifice resists transfer of the fluid causing pressure to develop in the chamber below the piston. As soon as the piston has passed through the restriction, the stretch taken in the rod or line causes the outer assembly to travel upwards with great speed and upon impact, transmits an upward force through the jar to anything suspended below.



Circle No. 38 on Postcard, Page 303

Big Four Machine & Supply Company

The McDermott Riggers' Forming Vise forms and holds wire rope and cable in the desired position around thimbles or fixtures for making slings for either splicing or U-clamp and clip installation. It will handle wire rope and cable from ⅜-inch to 1½ inches without use of adapters.

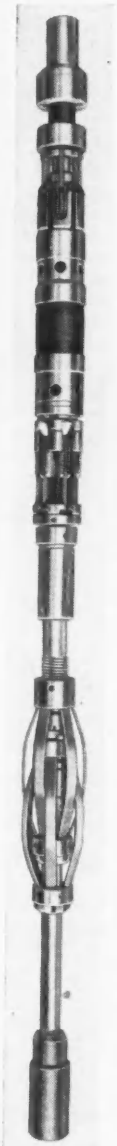
Circle No. 39 on Postcard, Page 303

Next Month:

The Gulf Coast Issue

Don't Miss It!

Baker Oil Tools, Inc.



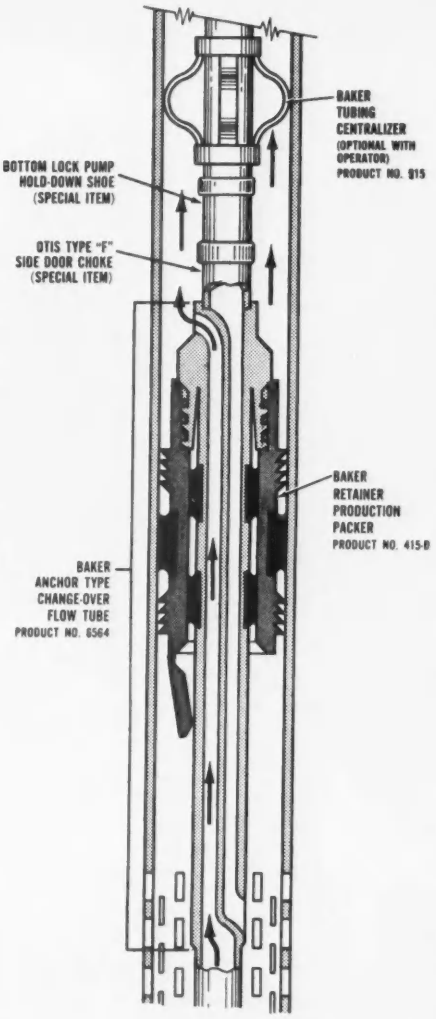
The Baker Pressure-N-Test Retrievable Packer is designed for production testing, acidizing, formation fracturing (with swabbing) testing casing, or for any similar operation except cementing where high differential pressures are developed from above or below the packer. The PNT Retrievable Packer has two sets (upper and lower) of opposed slips that act in combination with a resilient packing element to hold extreme pressure differentials (up to 5000 pounds per square inch) from above or below the packer without set-down tubing weight or increase in tubing tension. A valve-controlled packing element bypass provides a means of washing above and below the packing element. Ample circulation area (supplemented by the packing element bypass) makes it possible to run in faster without overflow, circulate the long way, and retrieve rapidly without swabbing. A reliable set and release mechanism, a safety slip lock that permits rotation out of the hole and the new Model "M" Circulation Joint are combined for dependable performance.

Circle No. 40 on Postcard

The Baker Wire Line Jar can be used in any wire line or sand line operation where the use of a jar is deemed necessary. It is being used to facilitate and expedite the operation of the Baker Model "F" Wire Line Feeler and Junk Catcher. The Baker Wire Line Jar is a "repeating" jar, in that it is recocked or reset automatically (with a relaxation of line tension) in preparation for the delivery of a "repeat" blow. The Jar is actuated or tripped by a pull of approximately 800 pounds. Positive and dependable jar action with a minimum pull on the line is the principal feature claimed for the new Baker Wire Line Jar.

Circle No. 41 on Postcard, Page 303

The Baker-Otis Selective Dual-Zone Production Hookup enables the operator to produce selectively (pump or flow), treat (formation fracture, acidize, etc.), or test either zone through the tubing while simultaneously producing the remaining zone through the annulus. The switch in flow or selection of a zone for treatment is accomplished at the discretion of the operator, using a regular steel measuring line. The switch is made without killing the well, without moving or removing the tubing string, and without otherwise disturbing the packer hookup in any way. The hookup is a standard Baker Two-Packer Dual-Zone Production Hookup using the Baker Model "D" Changeover Flow Tube, less the Bypass Collar. The Bypass Collar is replaced by a unit consisting of the Otis Type "H" Crossover Landing Nipple Assembly and two connecting subs. The Landing Nipple contains a recess to locate and lock either the Otis Type "X" Crossover Choke or the Otis Type "R" Parallel Flow Choke, depending upon the flow pattern desired.


BAKER TUBING CENTRALIZER (OPTIONAL WITH OPERATOR) PRODUCT NO. 915
BOTTOM LOCK PUMP HOLD-DOWN SHOE (SPECIAL ITEM)
OTIS TYPE "F" SIDE DOOR CHOKE (SPECIAL ITEM)
BAKER RETAINER PRODUCTION PACKER PRODUCT NO. 415-B
BAKER ANCHOR TYPE CHANGE-OVER FLOW TUBE PRODUCT NO. 6564

Circle No. 42 on Postcard, Page 303

Bucyrus-Erie Company

Bucyrus-Erie 36-L and 48-L spudders, designed to drill to 3500 and 6000 feet respectively, are now offered with tandem axle mountings to reduce axle loads and to conform to new highway vehicle regulations now in effect in many states. Eight large wheels evenly distribute the rig's weight. Axles are free to oscillate independently of the frame. Wheels can follow uneven ground without putting undue stress into frame. The company can supply present owners of these rigs with material, instructions and drawings for field mountings of the tandem axle on 36-L and 48-L spudders not now so equipped.

Circle No. 43 on Postcard, Page 303

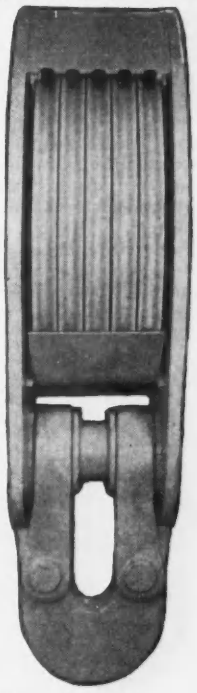
Barco Manufacturing Company

Barco Flexible Ball Joints now have increased pressure ratings in the Standard, 600 and 2500 series up to 7500 pounds per square inch. The ball joint provides movement in all planes in a single joint—360 degrees rotation plus 30 to 40 degrees flexing. The joints will handle either "flexing," "swing" or "rotating" movement. A clear opening through the joint prevents restriction or excessive turbulence. A ball joint consists of straight or angle casing, straight or angle ball, two molded gaskets providing the leakproof seal, nut which holds the ball and gaskets in place, and lock spring. In service, the ball seats itself automatically by pressure in the gaskets to provide a leakproof seal.

Circle No. 44 on Postcard, Page 303

Beaumont Iron Works Company

Type "PN" Traveling Block is of the narrow type with the center to center distance between sheaves only 3¾ inches. The narrow width allows the use of this block on deep holes where pipe space is at a premium. Sheave diameter of 52 inches reduces bending stresses on the wire line. Sheaves are grooved to API dimensions. Each sheave is mounted on a radial roller bearing and is separated and retained in position by a row of spherical ball bearings. The radial rollers are prevented from skewing as they carry no thrust load on the ends. This new BIW Traveling Block has a rated capacity of 300 tons at 100 rpm. Bearings and sheaves are interchangeable with the Type "KN" Crown Block.



Circle No. 45 on Postcard, Page 303

Birmingham Manufacturing Company

The Birmingham Oil Field Pump Trailer, designed to support engines, compound drive, and pump while mobile without causing misalignment, is of the gooseneck type, fabricated from extra heavy structurals, with rigid bracing, lapping and double welding. It is supported upon a dual axle spring suspended undercarriage with large tubular or solid axles. On location the trailer is raised with aid of built-in screw-type jacks for supporting on rigid base prior to operating engines and pump. Trailer capacity and dimensions are determined by weight and size of equipment to be installed on main frame. The trailers may be used with any type of machinery or equipment for which a mobile foundation is required.

Circle No. 46 on Postcard, Page 303

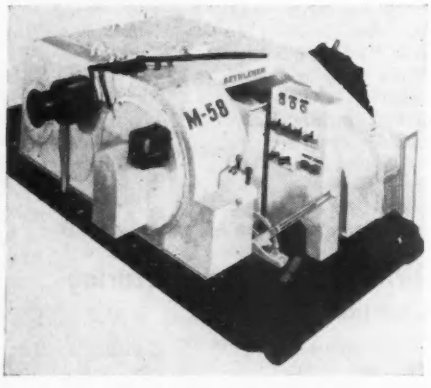
Baker Manufacturing Company

The 9-X Bulldozer, by elimination of push beams, mounts an eight-foot blade on the 70-drawbar horsepower 9-ton Allis-Chalmers HD-9 tractor. Incorporating Baker "Roller-Action," this narrower blade has approximately the same total blade area and capacity as the conventional 9-foot, 6-inch model for the HD-9 tractor. It is designed especially to meet the varied requirements of oil field use. The 9-X can be used for digging slush pits, preparing drill sites, clearing trees

and brush, making and maintaining haul roads, filling low spots and trenches, helping free stuck equipment, preparing construction sites and grading for drainage control. The dozer frame and tractor frame are bolted together as an integral unit. Thus, the tractor frame itself becomes the push beam. The tractor-dozer is raised and lowered as an integral unit by double-acting hydraulic cylinders connecting to the truck frame through a completely new lifting mechanism.

Circle No. 47 on Postcard, Page 303

Bethlehem Supply Company



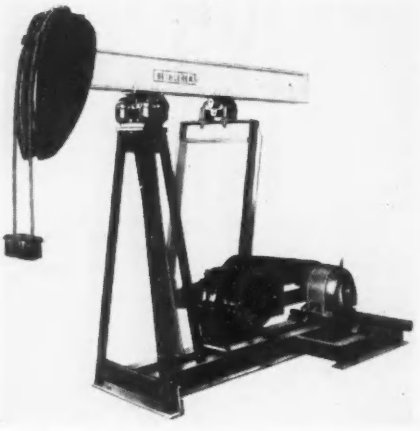
The M-58 Drawworks is designed for drilling to depths ranging from 5000 to 8000 feet, with 4½-inch drill pipe. The flexible, powerful unit has extra-large clutches, shafts, bearings, and enclosed brakes of the circulating water-cooled type. All service clutches are of the air-actuated friction type with gear spline type for transmission and engine compound. Two and three-engine drive groups are available, with gas or diesel engines.

Circle No. 48 on Postcard, Page 303

The 10 D-4 Pumping Unit has an API peak torque rating of 10,000 inch-pounds, a walking beam capacity of 4700 pounds,

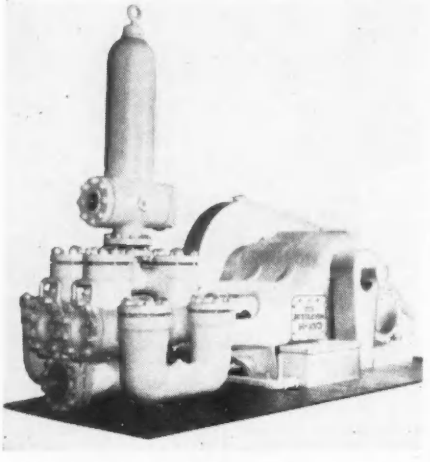
stroke lengths of 14, 16½ and 20 inches, and a total effective counter balance of 3910 pounds. The double reduction gear box is fitted with herringbone gears and roller bearings throughout.

Circle No. 49 on Postcard, Page 303



The 16D-5 is another small beam-balanced pumping unit. It has an API peak torque rating of 16,000 inch-pounds, a walking-beam capacity of 5150 pounds, stroke lengths of 16, 18½ and 22 inches, and a total effective counterbalance of 4560 pounds. The double reduction gear box with herringbone gears and roller bearings throughout is interchangeable with Bethlehem Supply's 25,000 inch-pound reducer.

Circle No. 50 on Postcard, Page 303



The H-150 Slush Pump, the latest addition to Bethlehem Supply's line of power driven slush pumps, is a 7¼ x 12-inch unit with a completely oil-bathed power end rated at 177 horsepower and 65 revolutions per minute. The pump has roller-bearing construction throughout, forged alloy steel gears and steel fluid end with API metal ring gaskets.

Circle No. 51 on Postcard, Page 303

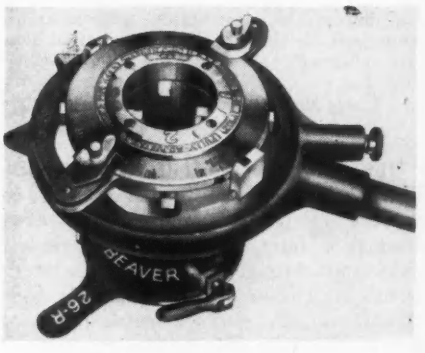
Buckingham Manufacturing Company, Inc.

Buckingham Thread Restorers are made in several sizes to clean and restore flattened, distorted, or badly rusted right or left-hand threads on bolts or studs up to

four-inch diameter. To operate, the machine is slipped over the bolt, cutting jaws are tightened into the threads close to the nut, and the handle is turned until the threader comes off the bolt. The threader is set and held to size by a single lock nut on the knurled handle. All working parts are finely machined and hardened. No changing of dies is necessary for different diameter sizes.

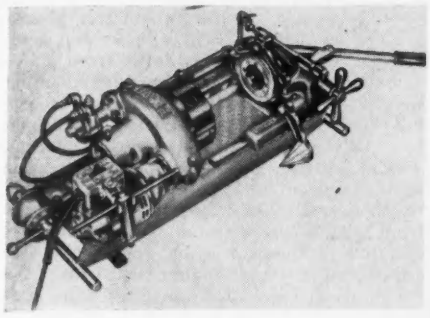
Circle No. 52 on Postcard, Page 303

Beaver Pipe Tools, Inc.



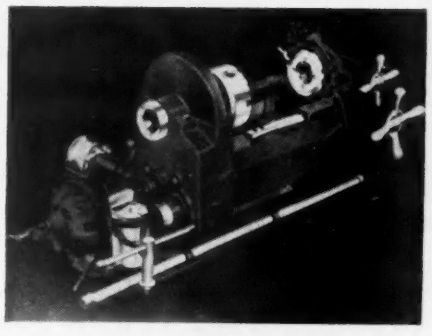
Beaver 26-R is successor to the old Beaver 26 one- to two-inch self-contained pipe threader. The 26-R threads 1-, 1¼-, 1½- and 2-inch pipe with only one set of dies. The tool can be adjusted to cut either standard taper or straight electric conduit threads. It has a self-centering chuck for accurate alignment and straight pipe lines but "drip threads" can be cut, too. Dies are set by means of a radio dial, and are instantly removable from the outside without use of tools.

Circle No. 53 on Postcard, Page 303



Model E Pipe and Bolt Machine is a 185-pound power tool for cutting and threading pipe, bolts and conduit. It is now equipped with the Safety Switch Lock which makes it impossible to start the machine unless chuck wrench has been removed from the chuck and placed in its holder. Model E has a total capacity up to eight inches, is lever fed, and has an outboard eccentric spool steady-rest to prevent the whip of long lengths of overhanging revolving pipe from rocking the spindle. The portable Model E uses the same die heads, the same dies, the same interchangeable wheel-and-roller or knife cutoff devices, and the same reamer arm and cone as heavier Models A and B. It has quick-opening adjustable ring-type die heads, and removable perforated tray that simplifies shaking chips out.

Circle No. 54 on Postcard, Page 303



Model A Pipe and Bolt Machine has been improved by addition of an automatic switch lock which makes it impossible to start the machine unless the chuck wrench is in its holder. The lock protects the workman from injury, and prevents the machine from becoming damaged. Also added to the Model A is an eccentric spool pipe rest, independent from the revolving spindle, which absorbs the whip of long lengths of rotating pipe and prevents excessive wear on the spindle bearings. It also eliminates leaking, flat-sided threads, caused by spindle rock. The machine cuts and threads ⅛- to 2-inch pipe; cuts off ¼- to ¾-inch bolts; and threads ¼- to ½-inch bolts. There are 186 kinds and sizes of dies available.

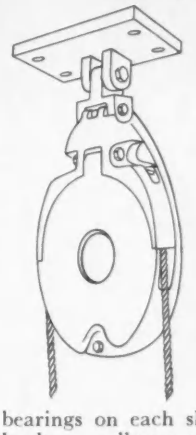
Circle No. 55 on Postcard, Page 303

Baash-Ross Company

The "DBM" Multiplex Block Assembly combines block, spring-loaded link ears and hook in one short, narrow unit. Weight of the Multiplex can be adjusted by adding lead to built-in pockets. The spring-loaded assembly incorporates both a hook for supporting the swivel, and separate link ears

"DBM" Multiplex Assembly

PB Quick-Change Production Block



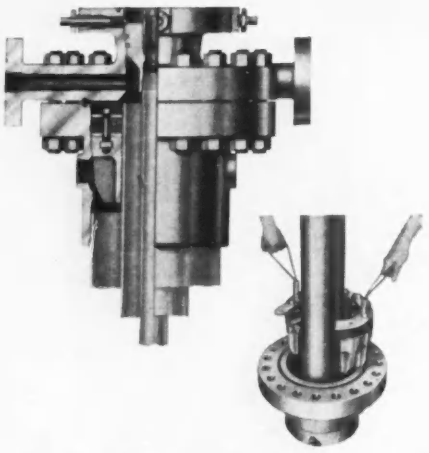
with locking arms for supporting the elevator links independent of the hook. The hook has an automatic lock, which, when open, helps guide the hook into the swivel bail. When closed, it cannot open under load. Internal framework consists of heavy rolled steel plates, while outer shell is cast steel. Double-row tapered bearings on each sheave carry full radial loads, as well as any thrust loads caused by fleet angle or spread of lines.

Circle No. 56 on Postcard, Page 303

PB "Quick Change" Production Block consists of two separate single-sheave blocks that can be locked together to provide a double-sheave block for pulling tubing and other lifting operations where the added capacity of a two-sheave block is required. It can also be quickly converted into a single-sheave block for pulling rods and other light duty operations. The "Quick Change" can be rigged as a two-sheave block while running tubing, then, to shift over to pulling rods, the block is separated into two parts and the unused portion is anchored to a plate in the corner of the rig, converting this portion of the hookup to a deadline. When used as a single-sheave block, the unit has sufficient weight to fall rapidly on the down trip. By pulling a single pin, each sheave can be completely exposed for laying the lines in place.

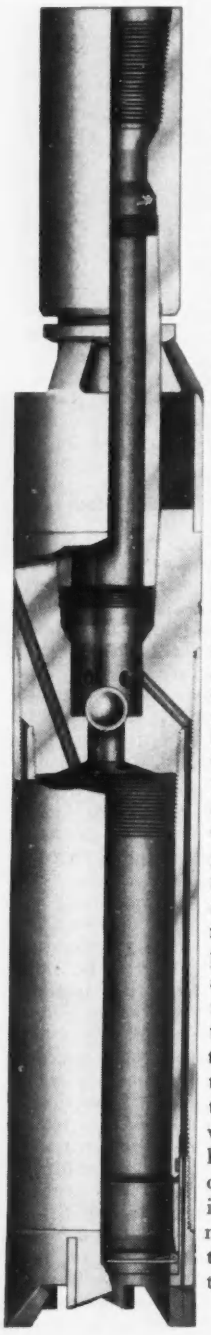
Circle No. 57 on Postcard, Page 303

Type "UPS" Wellheads combine packing element and slips into a single unitized asembly that wraps around the casing and is held in place by inserting one bolt. Hinged design of the slip assembly assures a full-circumferential grip around the entire surface of the casing, with each of the slip segments at exactly the same height. There is no need for stripping the packing and slips over the casing or breaking any flow connections. The heads can be used for a wide range of applications in medium and low pressure wells. Elimination of threads and grooves provides a smooth-surfaced bowl in which there is nothing to become damaged during drilling operations, and no need for protective sleeves or other accessory equipment. For safety, each string of casing is separately landed and packed-off without placing accumulated weight on preceding strings or slip members. As with Type "X" heads, threaded outlets are connected to an annular space between the



two casing welds to provide means for attaching a pressure pump and gauge so that the pressure-tightness of both welds can be tested simultaneously as soon as the welds are completed.

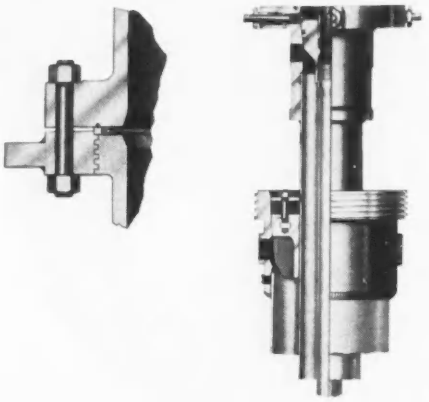
Circle No. 58 on Postcard, Page 303



Baash-Ross Costin Cone and Junk Catcher employs a controlled circulation principle in recovering bit cones, rollers, bearings, pieces of metal and other junk, on a single run in the hole. In operation, as the junk catcher approaches bottom, normal circulation is established to pick up small pieces of junk. The higher fluid velocity around the body of the tool carries the small junk upward above the junk basket. At this point the drop in fluid velocity, due to greater circulation area, permits the pieces to fall back into the junk trap in the top of the tool where they are held against further movement or circulation. After the small parts and pieces have been cleaned out of the hole and trapped where they cannot interfere with recovering the larger parts, a ball is dropped down the drill string to close off the normal circulation passages and establish a reverse circulation flow. Full fluid flow then travels down through outer passages to the bottom of the tool where it jets inwardly against the larger pieces of junk, centering and washing them up into the main junk basket in the lower end of the tool.

Circle No. 59 on Postcard, Page 303

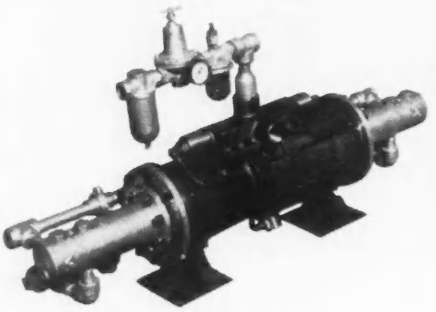
Type "UPS-DF" Heads are similar to "UPS" models, but also have demountable flanges that can be salvaged after the drilling operations for use on other installations. The flange is attached to the main body by means of a square thread so that it can be readily removed when drilling operations are completed. During drilling, the flange is installed on the head to provide means for attaching



standard pressure control. Packing prevents leakage between the flanges and is so placed that the square thread is not exposed to casing pressure. After drilling is completed, the pressure control equipment is removed and the flange is unscrewed from the head. Flange, ring bolts and packing can be used repeatedly on other wells.

Circle No. 60 on Postcard, Page 303

Brown Oil Tools, Inc.



The Brown Type HV-4 Pump, which is fluid or air operated, is designed to provide safe and dependable supply of fluid at high pressures. Double action minimizes pressure fluctuation. The pump is a ready source of power since it can be operated with any fluid. Designed primarily to operate on water, wet gases or vapor provide no obstacle to smooth, shockfree operation. The high pressure cylinders have displacement plungers rather than high pressure pistons. All working parts exposed to water are either high strength aluminum-bronze or monel, thus minimizing corrosion problems commonly associated with water pumps. High pressure valves are poppett type and the seats are provided with an O-ring seal. The entire operating valve assembly is on top of the pump and can be quickly and easily removed with a hexagonal socket screw wrench.

Circle No. 61 on Postcard, Page 303

Duo-Pak, new all-purpose packer, has self-actuating cup type seals above and below the setting, gripping and sealing mechanisms, which prevent them from becoming fouled by foreign matter always present in drilling mud. These cup seals provide auxiliary setting force from above or below the packer, thus very little tubing weight is required to set the packer and hold the seal. The principal sealing element of the Duo-Pak is expansible packing which is not dependent entirely upon tubing weight for compression to effect a reliable seal. The flow of rubber away from sealing engagement is prohibited by metallic retainers at each end of the seal which move into engagement with the casing as the seal expands. This eliminates the possibility of fouling by mechanically operated retaining members.

Circle No. 62 on Postcard, Page 303

Christensen Diamond Products Company

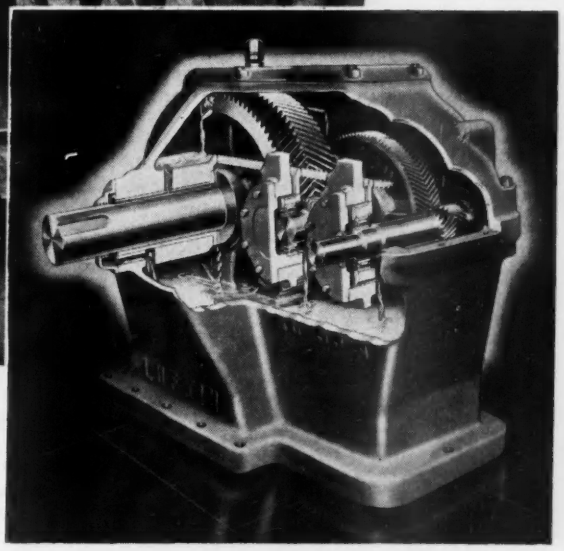
The Concave Drilling Bit can be used in hard, broken or fractured formations when drilling for footage, in whipstock operations, for drain hole drilling, hole straightening, reaming, or during well completions in pay sections. Its customary application is in the 5000 to 16,000-foot depth range. The manufacturer claims an average rate of penetration of 3.6 feet per hour. Sizes range from 4½ to 8⅞ inches outside diameter. Average diamond salvage after use is reported to be 58 percent.

Circle No. 63 on Postcard, Page 303

Camco, Inc.

The Type "MM" Retrievable Valve Mandrel is installed in the tubing string in the same manner as the conventional type mandrel, and with the valve in place, functions as a normal gas lift installation. When mandrels are placed with dummy valves on completion of a new well with a flowing life span of less than five years, valves may be installed in the well with a conventional wire line unit, without rig expense involved in pulling the tubing string. Any valve may be replaced without disturbing the other valves in the string. Normal operations through the tubing are unaffected since the mandrels are full opening to the inside diameter of the tubing.

Circle No. 64 on Postcard, Page 303



HYATTS

help maintain high oil production

One of the toughest applications for gears is in the reducer—the heart of an oil field pumping unit. One of today's most popular gear reducers is the Lufkin. There are over 35,000 of them now in use.

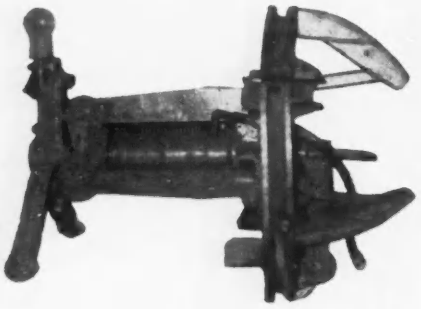
Among the precision-built, quality components of the Lufkin are Hyatt Hy-Load Roller Bearings. Hyatts reduce friction, help prolong the life of the equipment, and reduce operating costs—all important factors in profitable oil field operations.

Machinery and equipment produced by leading manufacturers for use throughout the oil field are Hyatt-equipped and have been for many years. The dependable performance of Hyatts is in no small way due to the precision and the year-after-year durability built into them. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

HYATT ROLLER BEARINGS

Crutcher-Rolfs-Cummings, Inc.

The C-R-C Internal Hydraulic Line-Up Clamp for line pipe is a heavy duty clamp providing up to 48,000 pounds pressure on each of the three line-up shoes. The clamp,

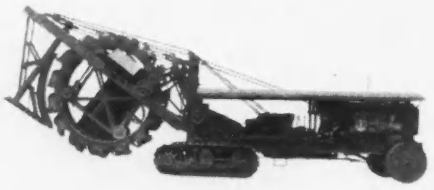


by replacing the shoes, will handle any size pipe from 16 inches up. The hydraulic clamp is actuated by two pumps, a fast acting and a high pressure pump. After the clamp has been inserted into the pipe, the fast acting pump will expand the shoes tightly against the pipe in 4 to 5 seconds with a ram pressure of about 3½ tons. Where greater pressure is required, the high pressure pump is actuated providing a ram pressure up to ten tons. The clamp weighs but a few pounds more than conventional clamps, while the actuating pump unit weighs 40 pounds, in aluminum, 65 pounds in steel. The pull pipe is 1 inch O.D. mechanical tubing and is attached to the clamps and the hydraulic cyclinder by means of quick couplings. The C-R-C Internal Hydraulic Line-Up Clamp comes equipped with one set of shoes, a pumping unit, and 40 feet of pull pipe.

Circle No. 65 on Postcard, Page 303

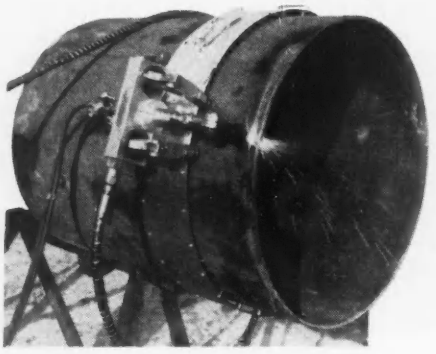
Middle-Incher ditching machine utilizes hydraulic power to replace gear-and-sprocket drives. Thus the speed of the conveyor works independently of the speed of the digging wheel. The Middle-Incher has a torque-converter drive which insures an even flow of power to the digging wheel regardless of digging conditions encountered. Controls for every operation are banked within easy reach of the operator. Approximate weight is 43,000 pounds. The machine is powered by a General Motors six-cylinder diesel engine that develops 147 horsepower. It cuts a 46-inch-wide ditch with a maximum digging depth of 7½ feet. The tracks are driven by independent drives which enable the operator to turn the machine completely around if necessary within the over-all length of the ditcher. It is 10 feet, 2 inches wide, 10 feet 10 inches high, and 35 feet long.

Circle No. 66 on Postcard, Page 303



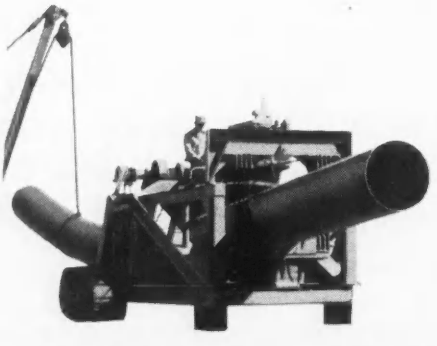
The C-R-C Big Incher Ditching Machine cuts to a depth of 8 feet, 6 inches, and from 32 to 52 inches wide. It is mounted on Caterpillar D-7 tracks 24 inches wide, and is powered by a Caterpillar D—13000, 110 horsepower engine. Steering and excavator controls are hydraulically operated. It provides 32 digging speeds ranging from a low of 1 foot, 4 inches per minute to a high of 34 feet per minute. The conveyor is driven independently of digging wheel by hydraulic motors, thus allowing any speed of conveyor belt. The Big Incher has a road speed of approximately two miles per hour. It weighs approximately 74,000 pounds depending on bucket size and attachments.

Circle No. 67 on Postcard, Page 303



The C-R-C Imco Pipe Beveler is a new, simplified, machine which will handle any pipe from 6 to 36 inches. It is a light weight machine which one man can handle (weighs approximately 35 pounds with attachment for 30 inch pipe). The cutting torch is guided by a flexible spring steel band which may be clamped on to the pipe rigidly to make a perfect and complete square cut. A different band is required for each pipe size. This new beveler cuts out of round pipe without elaborate setup. It requires only 6 to 8 inches clearance around the pipe. The complete set of bands for 12- to 36-inch pipe may be nested to take up a minimum of space for various sizes which may be required.

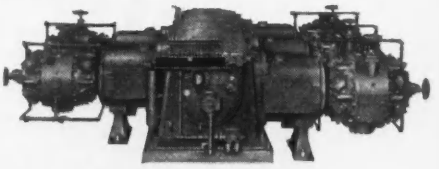
Circle No. 68 on Postcard, Page 303



The C-R-C Vertical Pipe Bending Machine makes smooth bends in all sizes of thin wall pipe and will handle up to half-inch wall, 30-inch o.d. pipe. It is a cable operated bender requiring a minimum of mechanical maintenance and is powered by a U-6 41 horsepower International engine. The machine is mounted at the tracks and weighs only 25,000 pounds. It can be transported on a standard truck float to the job site. The Vertical Bending Machine takes less right-of-way than the conventional side bender and the pipe may be placed in the machine from either end. The degree of bend may be measured with a level or bubble type protractor. The machine will bend pipe within 4 to 5 feet of one end and within 10 to 12 feet of the opposite end.

Circle No. 69 on Postcard, Page 303

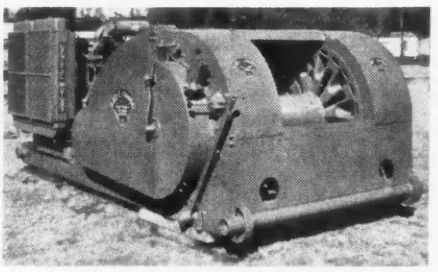
The Cooper-Bessemer Corporation



M-Line Compressors (horsepower to 5000) are built in sizes to meet any desired volumes or pressures. These power-driven compressor units are designed especially for rugged heavy duty service. Opposed cylinder design insures balance, while simplified construction provides accessibility and compactness. One-piece box-like frame permits low weight and sump type base for lubricating oil. Positive full pressure lubrication is provided to all moving parts. Units are equipped with built-in oil filter and cooler, and precision-type interchangeable bearings are used throughout. Electrical or pneumatic unloading by means of compressor suction valve lifters is available on all sizes. M-Line compressors are available in four standard sizes with one to six compressor drives. Speed range is from 300 to 514 rpm.

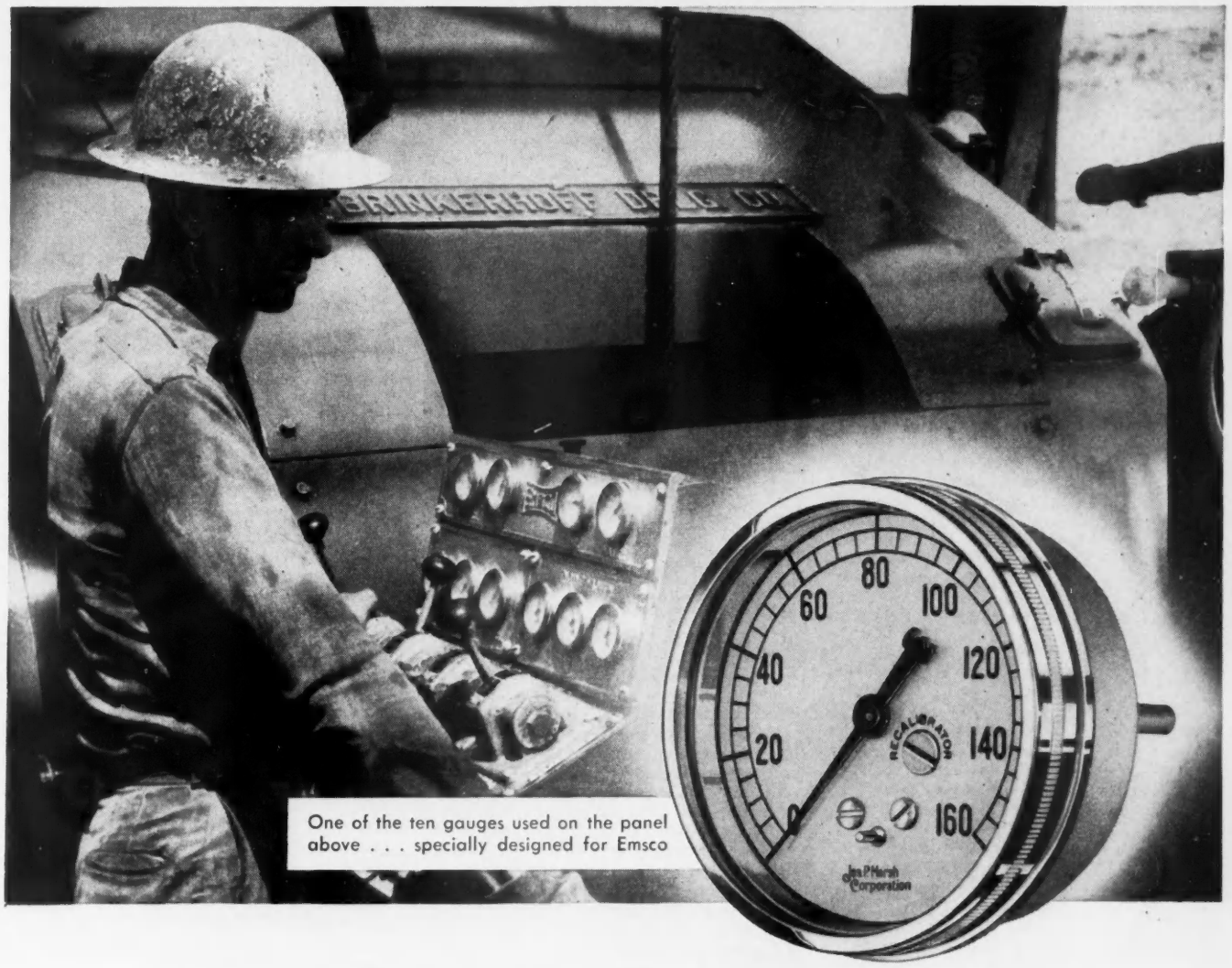
Circle No. 70 on Postcard, Page 303

Fred E. Cooper, Inc.



Cooper Models D-40, D-50 and D-60 are triple-purpose rigs designed for deep well servicing, workover and medium depth drilling. The transmission of the rigs has three speeds forward and one reverse, and may be shifted with finger-tip control while the unit is under full load and engine is running at full speed. The rigs have torque converter between engine and transmission, oil bath for chains, and a finger-tip control air clutch on drum and on rotary. All three models have large brakes—42-inch diameter x 8-inch face on the D-40, and 52 x 10-inch on D-50 and D-60. The rigs can be powered with suitable diesel or gasoline engines from 165 to 400 maximum brake horsepower. They are available with single or double drums and as trailer rigs with heavy telescoping masts or as skid units.

Circle No. 71 on Postcard, Page 303



One of the ten gauges used on the panel above . . . specially designed for Emsco

VITAL JOB FOR GAUGES

...only the best can measure up to it

That panel board is the nerve center of the rig . . . and those ten pressure gauges actually guide every move of the operator. This is no place to take chances on instruments of questionable quality; so the manufacturer of the rig—Emsco Derrick & Equipment Co. —has chosen the gauges that have proved worthy of this kind of trust . . . Marsh Gauges.

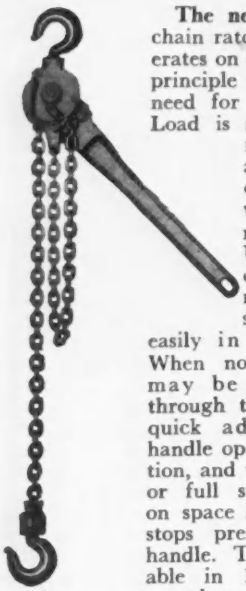
The choice of Marsh instruments by manufacturers of highest quality equipment in which pressure indication plays a vital part, is a familiar story. And the reason for this preference is equally familiar to everyone who has rubbed elbows with those dependable Marsh Gauges that are doing their job so supremely well wherever oil flows.

Marsh Gauges have been accorded top preference in the petroleum industry because they have set new standards all their own. Ask your supply house for facts or write for bulletins.

MARSH INSTRUMENT CO. *Sales affiliate of Jas. P. Marsh Corporation* **Dept. K, Skokie, Ill.**
HOUSTON BRANCH PLANT: 1121 Rothwell St., Sect. 15, Houston, Texas

MARSH GAUGES

Coffing Hoist Company



The new Model R coil-chain ratchet-lever hoist operates on a ratchet and pawl principle which eliminates need for a friction brake. Load is suspended on the ratchet and pawl at all times, thus cannot slip, nor will the holding mechanism freeze. Use of coil instead of roller chain permits the chain to swing or wrap easily in any direction. When not under load, it may be pulled freely through the hoist head for quick adjustment. The handle operates in any position, and with either partial or full strokes, depending on space limitations. Safety stops prevent spinning of handle. The unit is available in 1500- and 3000-pound capacities.

Circle No. 72 on Postcard, Page 303

The Coffing Hoist-Binder works on the ratchet hoist principle and will take up or slack off a load chain any amount up to a full 20½ inches—or more if a longer chain is used in the binder. This advantage over eccentric type binders is especially important with "springy" loads where the binding chain or cable must be tightened by force through considerable distance to fully secure the load, according to the manufacturer. If a load settles in transit, the unit may be tightened any amount without releasing the entire load to take a new "grab." Full strokes can be used for rapid take-up, while half-strokes permit minute adjustments. The binder chain may be pulled freely through the ratchet when not under load.

Circle No. 73 on Postcard, Page 303

The Challenger, a spur-gear hoist incorporating new design innovations, is available in ½- and 1-ton capacities. The entire unit, including standard length of high-strength coil chain for an eight-foot lift, weighs 39½ pounds, thus is easily moved from one place to another, as needed. Strength and resistance to shock-load breakage is gained by use of formed steel plate in the housing. Back place is laminated for extra rigidity in supporting the hoist mechanism. This plate and all other load holding parts are of high-strength steel that will hold five times the rated capacity of the hoist. The Challenger may be disassembled in a matter of minutes with simple tools.

Circle No. 74 on Postcard

The Philip Carey Manufacturing Company

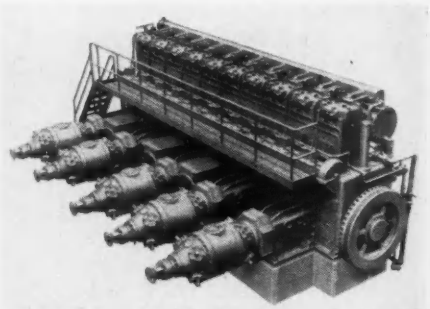
Carey Asbestos Pipe Line Felt is a high strength flexible asbestos felt (not less than 85 percent asbestos content) saturated with coke oven tars or an asphaltic compound. This product is strong enough to be used on pipe as large as 90 inches in diameter and yet flexible enough to be wrapped on pipe of half-inch diameter. The material is furnished in widths from 2 to 45 inches and roll lengths from 50 to 2200 feet (30# diameter). The weight is usually between 13.5 and 15.5 pounds per 100 square feet, but special weights are available on order. Carey Tar Saturated Asbestos Pipe Line Felt meets requirements of the American Water Works Association Specifications for this product. It is packaged in rolls individually wrapped in kraft paper with padded heads to prevent damage in transportation.

Circle No. 75 on Postcard, Page 303

Clark Bros. Company, Inc.

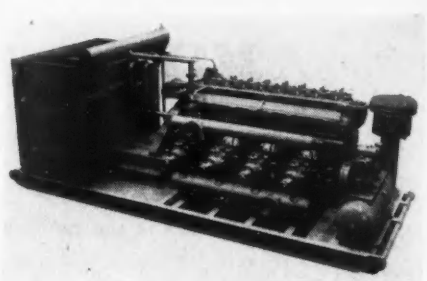
Clark Centrifugal Pipe Line Boosters are the first centrifugal compressors designed specifically for low ratio gas transmission pipe line application. These units require one pressure oil film type seal which is also a Clark design. Units are being built for a throughput in excess of 1.2 billion cubic feet per day and may be operated in parallel or placed in series operation with other units. Through simple internal modification decreasing ratios and larger flows can be accommodated to assure full loading of the driver at all times. Clark Centrifugal Pipeline Boosters can be driven by two pole induction motors, steam turbine or the Clark Gas Turbine.

Circle No. 76 on Postcard, Page 303



The Clark Model HLA is the third and largest member of the Clark "Big Angle" line of compressors. It was built specifically for installation on large diameter gas transmission pipe lines. It is built in 5-, 6-, 8- and 10-cylinder models of 1250 to 2500 bhp and mounts 3-, 4- and 5-compressor cylinders, respectively. It is the largest gas engine driven compressor available and concentrates more power in less floor space than any other compressor built, the manufacturer claims. The HLA is of ultra simple Clark super two-cycle design. It has extra rugged construction and incorporates spiral flow power cylinder cooling, oil cooled piston heads and piston skirts, a massive forged steel crankshaft, and precision bearings. It can be used for gas pipe lines, gas utilities, chemical plants, natural gasoline plants, repressuring operations or wherever maximum power in minimum space is desirable, according to Clark Bros.

Circle No. 77 on Postcard, Page 303

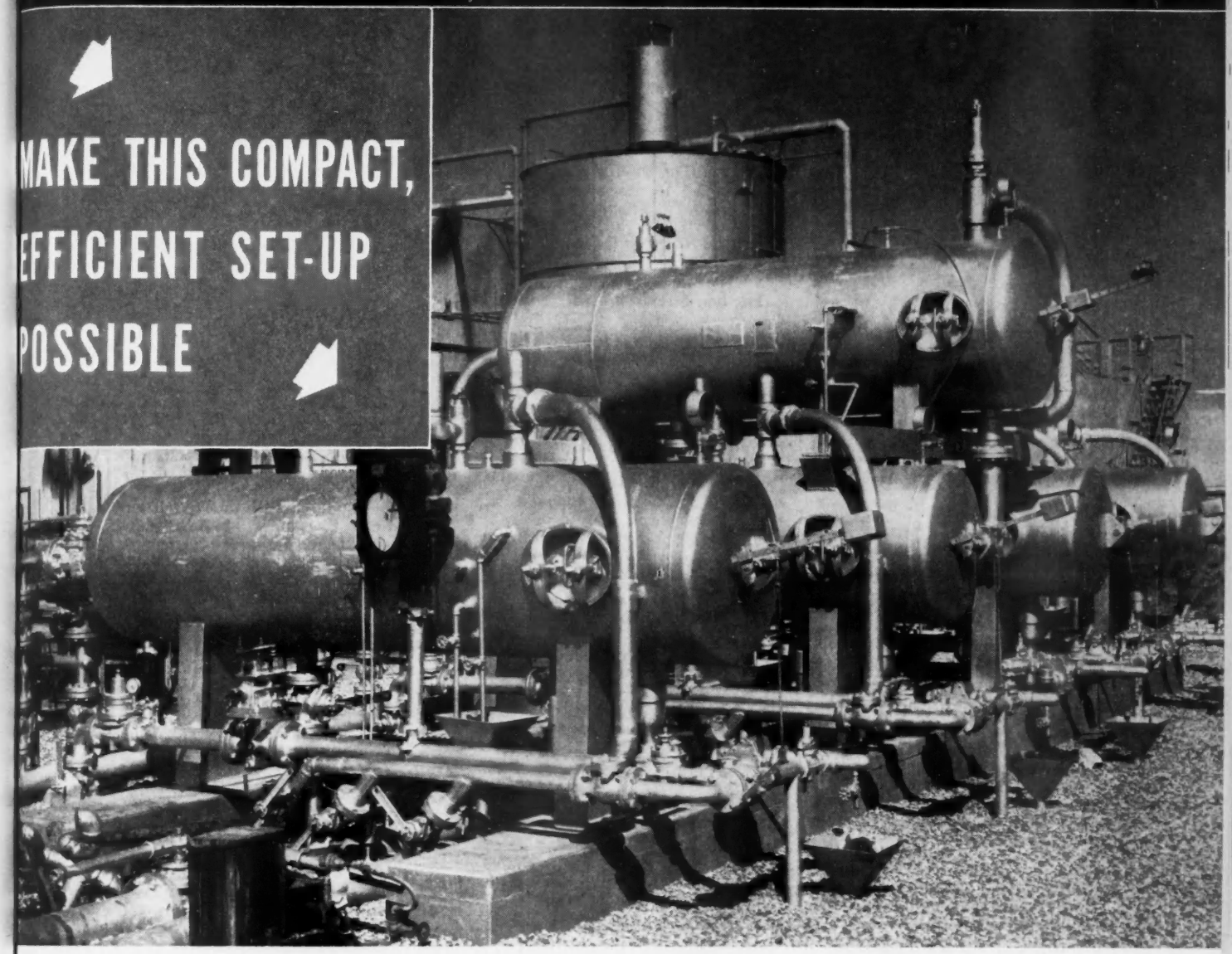


The New Clark Midget Angle is the only compressor unit specifically designed and built from the ground up for semi-portable, skid-mounted field service. Design principle eliminates all unbalanced forces both in a vertical and horizontal plane, permitting operation anywhere, including floating barges, piling, truck trailers, steel framework and even on timbers, and reducing maintenance costs. The Clark Midget Angle is of extra rugged design and operates at an extremely conservative B.M.E.P. rating. The super two-cycle Midget Angle is built in 2-, 4-, 6- and 8-cylinder units rated at 80 to 330 bhp, mounting as standard equipment, 1-, 2-, 3- and 4-compressor cylinders. It is available as either a stationary unit or as a completely self-contained compressor station consisting of a rugged steel skid, compressor, radiator, starting air compressor, provision for intercooling and after cooling, scrubbers, etc. It is suited to gas lift, flare gas elimination, booster service, repressuring, gas storage, and many other applications.

Circle No. 78 on Postcard, Page 303

ONLY *PARKERSBURG* SINGLE TUBE HORIZONTAL SEPARATORS..

MAKE THIS COMPACT, EFFICIENT SET-UP POSSIBLE



• Such a compact, efficient separator set-up as this is possible only because Parkersburg Horizontal Separators require no second tube . . . no liquid legs . . . no extra vessels. And the large single tube does a more efficient job of separation . . . handles a larger volume than other separators of equal nominal rating . . . withstands colder weather without freezing.

More efficient separation results from:

1. **Greater surface area for dissipation of foam and ready equilibrium of gas with oil,**
2. **Greater area for gas flow reduces velocity as much as 20% . . . and proportionately increases the time for separation,**
3. **Longer retention time of larger volumes of oil provides more time for degassing of liquid, without reducing total separator volume,**
4. **With gas and liquid in the same tube, well stream keeps separator liquids warmer so there is less danger of water freezing in cold weather, at given gas temperature,**
5. **Only one tube to clean, which can be done easier and more effectively because of the open area the entire length of the tube and 3 drain connections.**

Ask your Parkersburg Representative for additional data about Parkersburg Horizontal Separators — or write for latest bulletin.

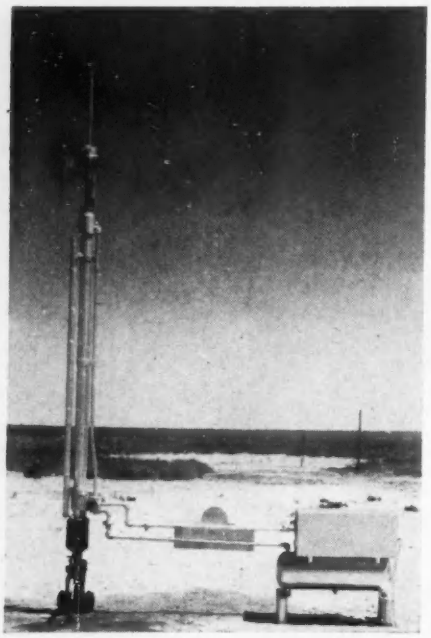
No. 5206

PARKERSBURG

PRESSURE EQUIPMENT

HORIZONTAL AND VERTICAL SEPARATORS • HYRECO • HYDRACEPTER • SCRUBBERS • TREATERS • HEATERS

S. C. Carter Varicycle Sales Company

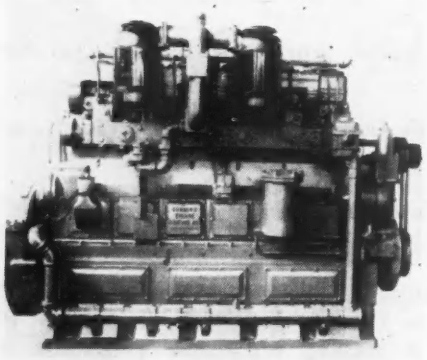


The Salentine Varicycle hydraulic pumping unit for stripper and/or shallow wells has a variable cycle, whereby a fast downstroke and slow upstroke may be obtained, approaching constant flow conditions. Accurate stroke rate adjustment allows any well with moderate or small production rate to be pumped continuously without pumping the well off. Large volumes may be obtained by use of a large bore bottom-hole pump, at a slow rate. This reduces rod maintenance and failures. The unit consists of a hydraulic cylinder, with 72-inch piston travel, which screws into the pumping tee. Power unit consists of a rotary pump mounted on a small fluid tank. No foundation is necessary.

Circle No. 79 on Postcard, Page 303

Cummins Engine Company, Inc.

Model LR-600-GAS Engine is designed to take advantage of the plentiful supply of natural gas in some oil producing areas, and will be used primarily to power drilling rigs. It is a six-cylinder, spark ignition engine, with a displacement of 2477 cubic inches, a bore and stroke of 7¼ by 10, and a maximum rated horsepower of 315 hp. It is equipped with a gas carburetor, mixing valve, magneto, and other special accessories for gas operation. Approximate weight of the engine is 7500 pounds, and it has a compression ratio of 6.8 to 1. One of the standard items of the LR-600-GAS engine is air starting equipment. A 32-volt electric starting system is optional. Two oil bath air cleaners are provided, as well as a mechanical flyball type governor, and a water-cooled exhaust manifold. The LR-600-GAS engine also has a gear pump for pressure lubrication to all bearings; aluminum pistons and removable wet type cylinder liners. The cooling water temperature is controlled by thermostats in both the main and by-pass water systems.



Circle No. 80 on Postcard, Page 303

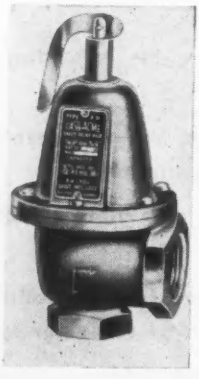
The new Standard Model 365 Jaeger air compressor, rated at 365 cubic feet of air per minute at 100 pounds per square inch pressure, utilizes a 165 hp Model HRBI-600 Cummins Diesel for its power plant. Engine operating speed of the diesel-compressor unit is 1240 rpm. Both the Cummins Diesel and Jaeger compressor are mounted on structurally welded main frames. The heavy duty wagon has an "autosteer" front axle, and can be hauled safely at 35 miles per hour over rough roads. Steel wheels or skid mountings are also available. Length of the complete rubber tired unit is 12 feet, 3 inches; width—

5 feet, 10½ inches; height—6 feet, 9 inches; and weight—8500 pounds. The 165 hp Model HRBI-600 Cummins Diesel is a six-cylinder full diesel, with a displacement of 743 cubic inches; a compression ratio of 15.5 to 1; a maximum rated rpm of 1800; and a net weight of 2365 pounds.

Circle No. 81 on Postcard, Page 303

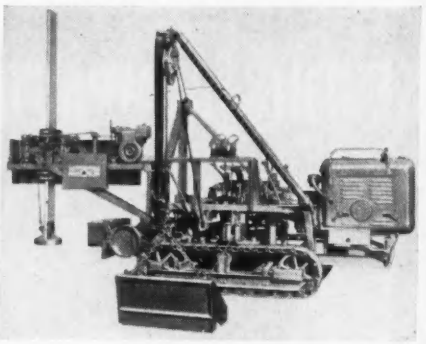
A. W. Cash Valve Manufacturing Corporation

Cash-Acme's Type F-51 is a new safety relief valve intended for use on hot water space heating boilers, tanks and heaters. It is available in pressure settings from 30 to 125 pounds, with corresponding Btu ratings at various pressure settings. The valve has sufficient capacity to relieve pressure due both to thermal expansion of water and to steam which is caused by failure of the firing device to shut off. It is an all-bronze valve with a high lift design, stainless steel spring and silicone seat disc.



Circle No. 82 on Postcard, Page 303

The Cleveland Trencher Company

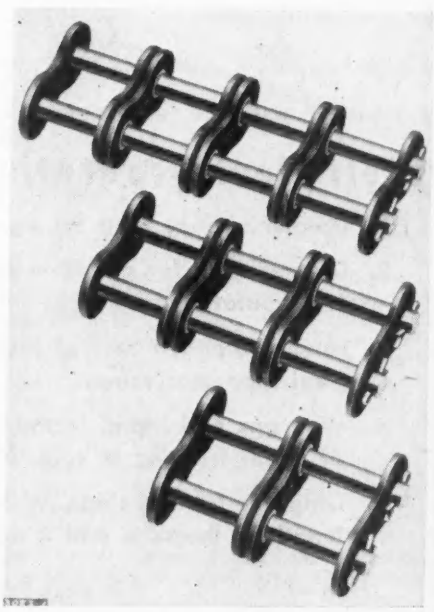


The "Model 80" is a one-man operated machine that tamps, backfills, lays pipe, unloads and handles pipe, sheathing, etc., and does all types of light crane work. The machine is mounted on a crawler having 24 travel speeds ranging from one foot per minute up to 2⅛ miles per hour. Model 80 tamps while traveling either along the side of the trench or straddling it. The tamper delivers a 380 foot-pound blow, 45 times each minute. The backfiller is a conventional drag-line type with telescopic boom. It backfills from either side of the trench. Without extra counterweights, the power-operated boom will lift a weight of 6000 pounds, located three feet from the edge of the crawler track.

Circle No. 83 on Postcard, Page 303

Diamond Chain Company, Inc.

Bushed Centerplate Links for connecting Diamond multiple strand roller chains are built for severe service, but are as easily installed and removed as slip-fit centerplate connecting links. Centerplate units consist of two centerplates assembled with heavy press-fit on two pitch-hole bushings The bushings are file-hard to resist wear. Bushing holes of the centerplate units are ground after assembly for minute clearances on the pins and for pitch accuracy matching that of the outside linkplates of the connecting link.



Circle No. 84 on Postcard, Page 303

Diamond Bit Company

The Williams Wire Line Core Barrel employs "split circulation"; that is, there is conventional circulation to the outside of the bit, and reverse circulation up along the core. With this circulation, the manufacturer claims no foreign material can be washed under the bit after it is once seated properly. During coring, any small fragments of the core that are not sufficiently secured are washed away through the side ports. This reverse circulation by the core frees core travel rather than binds it as in the conventional core barrel.

Circle No. 85 on Postcard, Page 303

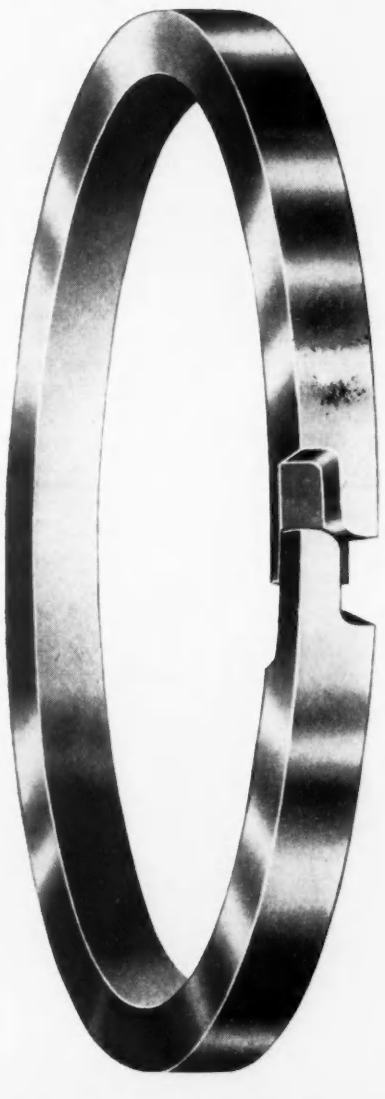
The Williams Spraberry Bit was designed especially to meet the demands of the Spraybery sand of West Texas. It is tough enough to drill the black shale above the pay sand, and still capable of penetrating fast enough to offset the cost difference, according to the manufacturer. In field tests, the bit drilled from 700 to 800 feet without trips, and stayed on bottom for as many as ten days.

Circle No. 86 on Postcard, Page 303

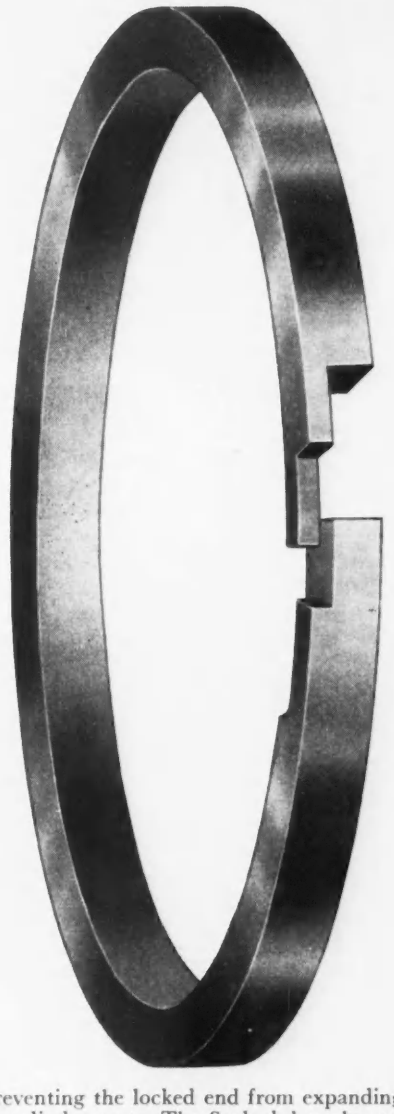
Double Seal Ring Company

The Inseal is a new one-piece sealing ring with the sealing member on the inner side of the ring. The new piston ring seals fully from both sides and has no "top" or "bottom" side. It is semi-locking and thereby lessens the danger of clipping the ring ends in cylinder ports in two-cycle engines. The ring is adaptable to both single and double acting equipment and has been field tested in two- and four-cycle engines, steam engines, air compressors, hydraulic equipment and other applications.

Circle No. 87 on Postcard, Page 303



Sealock Piston Ring lessens the possibility of rings catching in cylinder ports, because the locking feature of the ring holds one of the ring ends "in" against the other,



preventing the locked end from expanding in cylinder ports. The Sealock has characteristics of other Double Seal Ring Company sealing rings, including full sealing against compression blowby, even in worn liners.

Circle No. 88 on Postcard, Page 303

Diamond Hard Metal Products, Inc.

Diamond Hard Metal Bands are protective drill string collars made by a rolling process of the hardest commercially known hard-facing material, and combine abrasion resistance with ductility. The bands may be applied to tool joints by regular crews using ordinary welding technique. They can be applied on badly worn joints by arc-welding flush on the outside surface, and on new joints by countersinking below the surface. Field tests during the past two

years indicated that the same set of Diamond Bands added 50,000-100,000 extra feet of hole to the life of the drill string.

Circle No. 89 on Postcard, Page 303

The Duff-Norton Manufacturing Company

The No. 1523 All-Purpose Oil Field Jack has a swivel base which permits its use at full 15-ton capacity at any angle. This jack is designed to do practically all lifting and lowering, pushing and pulling jobs in oil field service. Four types of jacking are possible: (1) straight lifting with load applied to the head, (2) chain lifting, (3) claw lifting and (4) foot lifting of low height loads with the integral foot lift. In chain lifting, a newly-developed pear-shaped ring permits great adaptability in pulling poles, stumps and beams. In claw lifting, the ball and socket design of head and claw provides large support area and protects against load shifting. The Jack will raise loads up to 12½ inches. Closed height is 23 inches; foot lift is 2¼ inches from the ground. The load is raised only on down-stroke of the lever bar. In lowering, the load is brought down a notch at a time by the upstroke of the lever bar. Under no circumstances can the load be tripped accidentally.

Circle No. 90 on Postcard, Page 303

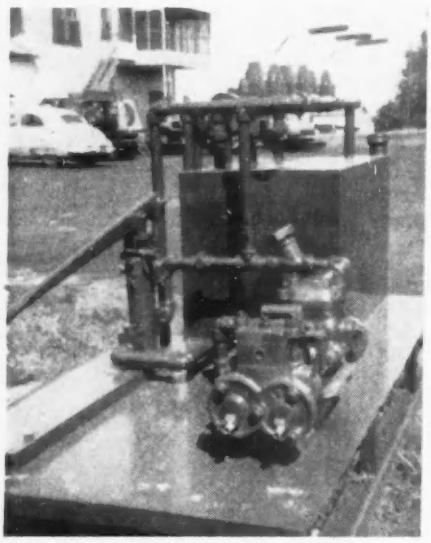
Dresser Manufacturing Division Dresser Industries, Inc.

Dressertape, a new polyvinyl chloride pipe tape, is said to possess exceptional die-

lectric and insulation properties. The 10 mil Dressertape has an insulation resistance of 100,000 megohms and dielectric strength of 10,000 volts. Dressertape has high adhesive firmness, extra strength, sunlight resistance and good aging qualities. It provides protection against water, salt water, acids, alkalies, oil and soil chemicals. The new tape is claimed to conform readily to irregular surfaces, making it adaptable for the protection of fittings on service lines. It is applied cold and is therefore safe for workmen to use in cramped ditches. Backfilling can be done immediately, since Dressertape requires no "setting-up" period.

Circle No. 91 on Postcard, Page 303

B. M. Davis Tool & Machine Company, Inc.



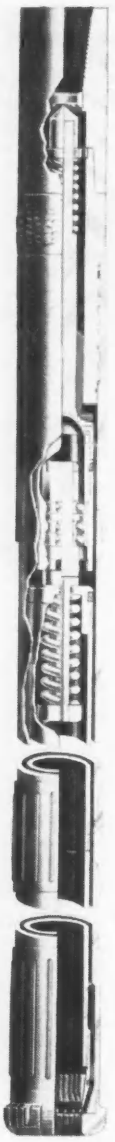
The Davis Blowout Preventers Pump is used to close fluid-operated blowout preventers. It is mounted with one small steam pump, operated off the rig air system, and one hydraulic hand pump. The preventers and reserve tank are filled with 60 percent diesel fuel and 40 percent motor oil to protect pistons from mud and sand.

Circle No. 92 on Postcard, Page 303

Drilling & Service, Inc.

The Diamond Core Head has a new, improved hard matrix to resist abrasion and foreign objects in the hole such as chert and junk.

Circle No. 93



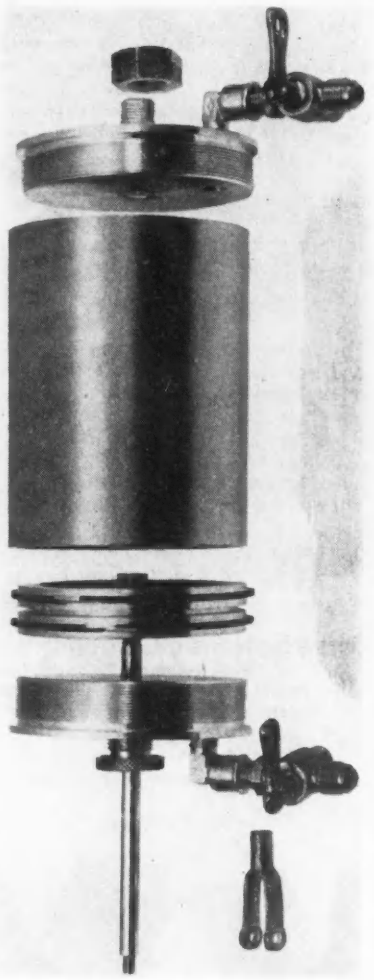
Diamond Drill-Bit is designed to cut full hole, thereby reducing the rig trips necessary with a core bit. However, this bit is not effective in all formations and a Drilling & Service engineer should be consulted before its use.

Circle No. 94

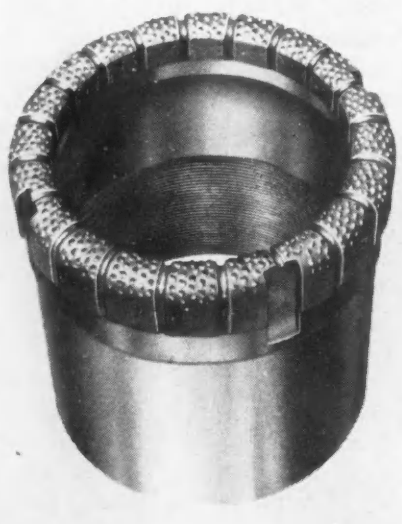
Diamond Core Barrel is equipped with a Core Wedge Indicator which indicates wedging cores through pump pressure increase. This reduces rig time when coring fractured formations, and also usually increases length of core per trip, according to Drilling & Service. The barrel is designed for installation on a standard core barrel in the field without alterations.

Circle No. 95

Empire Machinery Company

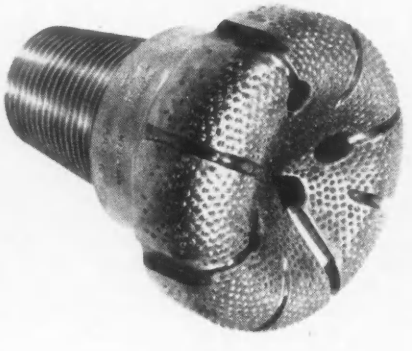


The Hart Vacuum Control synchronizes the load between compounded gas or gasoline engines. Its operating principle is simple—a vacuum differential set up by carburetor vacuum on both sides of a double-acting piston, positions a piston rod connected to the throttle valve of each engine. When the vacuum throttle controls have been adjusted, the load between two or more compounded engines will be equal-



The Diamond Washover Shoe is a new diamond development for washing over stuck drill pipe, packers, etc., when conventional means fail.

Circle No. 96 on Postcard, Page 303



Drilling Bit

←——Washover Shoe Core Head——→

ONE OF MANY REASONS WHY
HALLIBURTON'S BEST FOR YOUR DRILL STEM TEST!

You get the benefit of a *big* research program when Halliburton tests your well. It's the *only* testing service developed and improved by 25 years of energetic research.

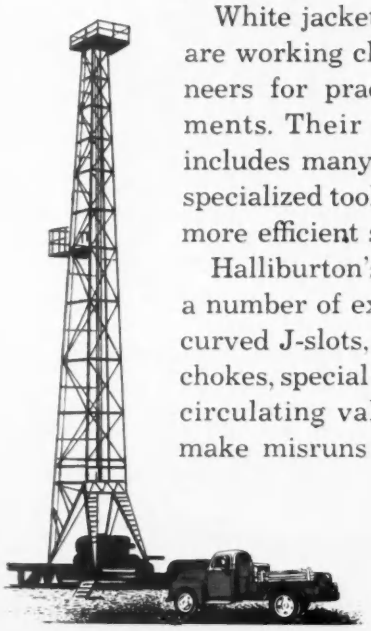
White jacket wizards in big modern labs are working closely with astute field engineers for practical, grass-roots improvements. Their impressive record to date includes many important contributions in specialized tools, advanced technology, and more efficient service.

Halliburton's present day equipment has a number of exclusive features – the new, curved J-slots, automatic locks, adjustable chokes, special duty packers, multi-purpose circulating valves – and others that help make misruns a rarity with Halliburton.

Another highly important feature is Halliburton's exclusive Bourdon Tube that gives you far greater accuracy in Pressure Recording. The absence of packing glands in this instrument makes it much more sensitive to slight variations of pressure than other types. You get this greater accuracy from Halliburton at no extra cost.

Halliburton's big research program will continue to develop and improve its testing equipment and methods. It's your firm assurance that Halliburton's best for your drill stem test – today, tomorrow, and the years ahead.

Be sure you get every possible benefit from your next test. Phone your nearby Halliburton representative. Halliburton Oil Well Cementing Company, Duncan, Okla.



MORE REASONS WHY HALLIBURTON'S best

YOU'RE ONLY MINUTES AWAY:
Halliburton has 177 field camps in the U. S. and Canada. 139 of these camps are strategically located in the mid-continent. That puts your Halliburton Tester only minutes away and ready to go as soon as you call.

YOU GET REAL PERSONAL SERVICE:
Your Tester stays on the rig from start to finish when Halliburton tests your well. This highly important operation requires close, full-time, personal attention, and no one is more aware of it than your Halliburton Tester.

YOU GET MILLION-JOB EXPERIENCE:
There's no substitute for experience in servicing an oil well. And that makes Halliburton first in its field – for Halliburton offers you the enormous experience of service on more than a *million* jobs.

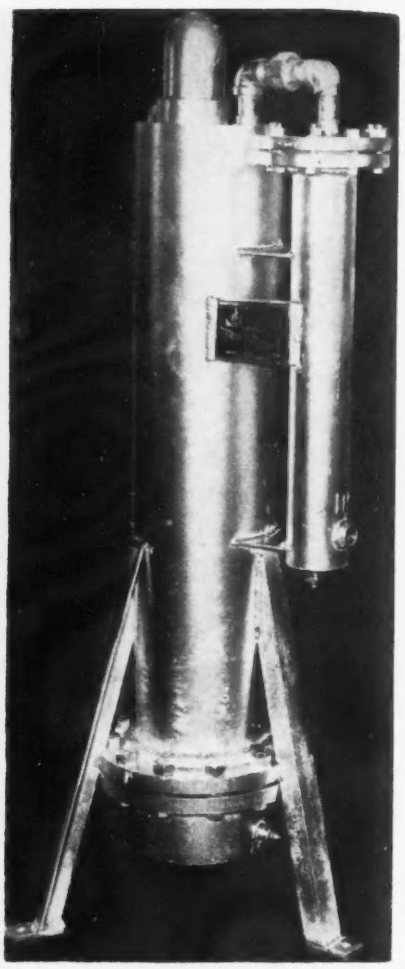
HALLIBURTON

YEARS AHEAD IN DRILL STEM TESTING!

ized. There are no diaphragms, and the working parts are of metal construction. Each control is interconnected by tubing, and the entire system is tied into the carburetor intake manifold of the lead engine. The unit is adaptable to oil field installations, industrial power units and other multiple engine drives. The control is not designed for use on diesel or supercharged engines.

Circle No. 97 on Postcard, Page 303

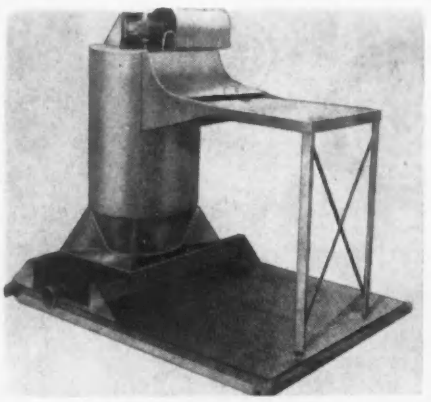
The Empire Compressed Air Dehydrator eliminates expensive shutdowns on air controlled equipment caused by oil or moisture in the air line. In operation, a primary absorbing chamber filled with white waste first filters the air and frees it of any oil. From there moisture in the compressed air



is absorbed by a desiccant (or drying agent) in the main chamber. Once through the Compressed Air Dehydrator the compressed air is free of sludgy oil and freezable moisture. Two models now in production take care of most requirements for air control equipment; however, larger or smaller units can be provided to meet special requirements.

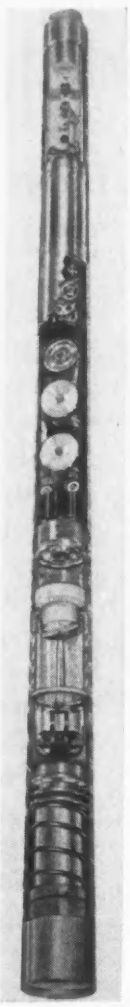
Circle No. 98 on Postcard, Page 303

The Metering Mud Mixer, differs from conventional mudding equipment in that it meters the flow of dry chemical mud entering a pressure wet stream. Agitation in the hopper chamber keeps this sacked mud in a constant state of activity. Stirring directs the dry mud through the metering hole in a flow which can be quickly regulated to produce the desired viscosity of



the final mixture. Chemical mud is accurately metered and blended to retain its high bottom-hole qualities.

Circle No. 99 on Postcard, Page 303



Eastman Oil Well Survey Company

Eastman's Multiple Shot Survey Instrument provides a safe, fast and accurate method of making magnetic directional surveys. The drop type instrument is 1¼ inches in diameter and 24¾ inches long, and weighs 2 pounds, 14 ounces. A new type of angle unit is used that settles instantaneously and can accurately measure angles from vertical to 90 degrees from vertical. The cycle of the instrument is only one minute. In its protective barrel the instrument is dropped inside the drill pipe and lands in a nonmagnetic drill collar, or protrudes through a core bit, and the survey is run while the drill string is being pulled out of the hole. At shallow depths or with a fast rig, no waiting time is required to get a good recording, because the drill pipe is immobile long enough during normal pulling operations.

Circle No. 100 on Postcard, Page 303

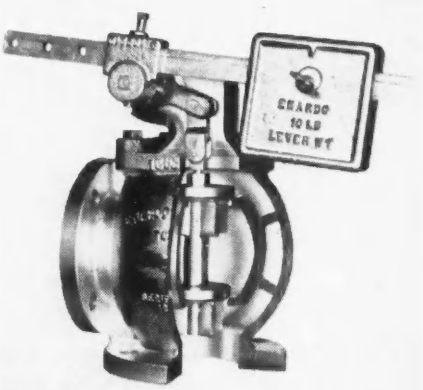
Enardo Manufacturing Company

The Enardo Series 1500 Oil Valve is a full flow type valve, with double discs, and lapped metal-to-metal seats. It is angle design with balanced discs, and is available for either flange mounting or threaded with a hex shoulder. With a test bursting pressure of 1800 pounds, it is designed for use on low pressure (125 pound) separators. The lever is close to the body for compactness, and from the center of the lever to the center of the body is only three inches. All parts except the body and valve disc, are interchangeable with the Series 2500 Gas Valve, in the 2-, 3-, and 4-inch

sizes in which these valves are built. These features, together with reversibility of the cover and shaft, and the manway cover linkage, make these valves suitable for either replacement or new installations.

Circle No. 101 on Postcard, Page 303

The Enardo Series 2500 Gas Valve is also of the full flow type with double discs and lapped metal-to-metal seats. The Gas Valve is of the In-Line design, with unbal-



anced discs to permit it to open ahead of the oil valve. In all other respects it is like the Series 1500 Oil Valve. The Series 1500 Oil Valve and the Series 2500 Gas Valve were engineered to work together.

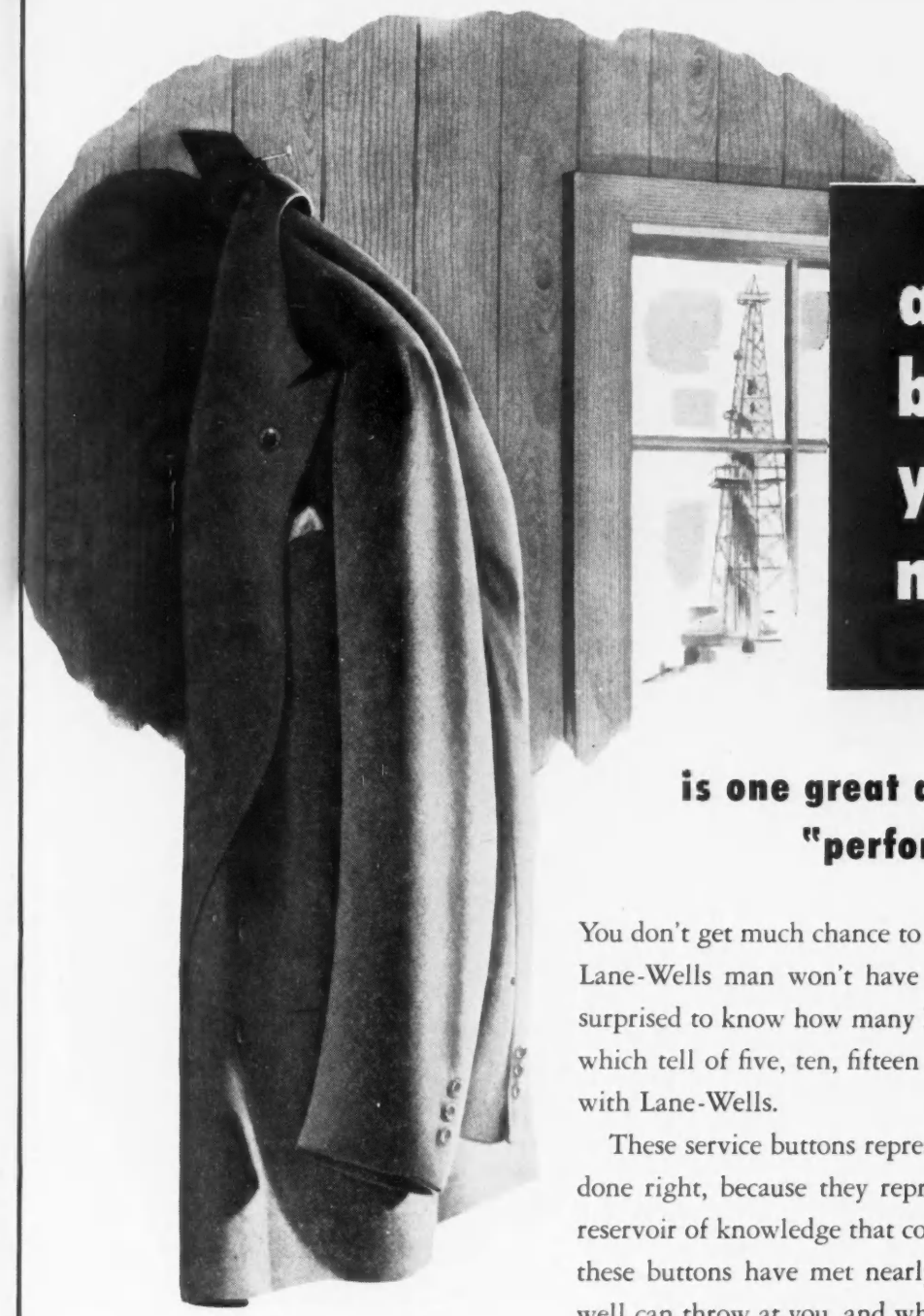
Circle No. 102 on Postcard, Page 303

The Eagle-Picher Company

One-Cote Cement an insulating coating composed of Eagle-Picher mineral wool and other materials, may be applied to the desired thickness with just one application. Installation economies are effected when it is installed inside, eliminating the need for finishing treatment unless the insulation is exposed to unusual conditions. It has varied applications in the heat-control operations, and may be used for coating valves, fittings, storage tanks, steam cylinders, air preheaters, hot air ducts, turbines and piping. One-Cote may be applied to equipment when hot or cold. It may be applied outside, under normal conditions, and will withstand rain or moisture two hours after application without softening. Oil base paints can be applied directly over this insulating coating.

Circle No. 103 on Postcard, Page 303

Fireproofing Cement is a dry mixture of fibers, aggregates and binding agents. When mixed with clean, fresh water at



LANE-WELLS 10 SERVICE

a tiny button you may not notice

is one great assurance of "perforating jobs done right!"

You don't get much chance to see this button, because usually your Lane-Wells man won't have it on his work shirt. But you'd be surprised to know how many Lane-Wells men have these buttons, which tell of five, ten, fifteen or more years of continuous service with Lane-Wells.

These service buttons represent your greatest assurance of a job done right, because they represent oil field experience—and the reservoir of knowledge that comes with it. The men who can wear these buttons have met nearly every perforating problem an oil well can throw at you, and when the answers weren't in the book, they've made their own answers—and seen them become standard practice in one field after another. The thousands of man-years of experience these buttons represent—the oil field know-how gained in 170,000 perforating jobs—are why...

Operators from California to Kentucky can tell you

Call LANE WELLS for Better Perforating

Tomorrow's Tools-Today!

General Offices, Export Office, Plant • 5610 So. Soto St., Los Angeles 58

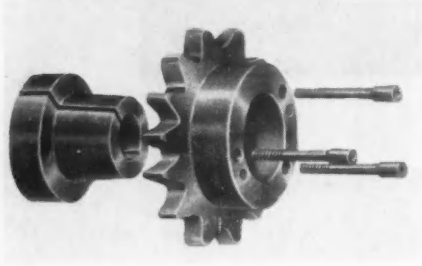
LOS ANGELES • HOUSTON • OKLAHOMA CITY • LANE-WELLS CANADIAN CO. IN CANADA • PETRO-TECH SERVICE CO. IN VENEZUELA

the recommended ratio, it is applied to surfaces which require protection. Rust inhibitors are incorporated in Fireproofing Cement to afford protection against rust and corrosion where the material contacts structural members. It is applied by trowel, like most insulating or finishing cements, and is applied to the desired thickness in only one operation. When the fireproofing treatment is exposed to weather, bumping, abrasion, fumes, vibration or other abnormal conditions, a protective finish is recommended. Fireproofing Cement, when spread to a thickness of 1¾ inches, provides three hour protection according to tests conducted under ASTM Standard E-119.

Circle No. 104 on Postcard, Page 303

Fort Worth Steel And Machinery Company

The "QD" Sprocket is taper-bored to receive the tapered hub of a V-belt sheave. Bolts are provided to pull the sprocket



onto the tapered split hub for a tapered drive assembly and a positive press fit on the shaft. Tapped holes in the sprocket permit the use of pull-up bolts as jack screws to break the tapered fit when dismounting the sprocket. Set screw over the keyway holds key in position. The sprockets are available in half-inch through 1¾-inch pitch.

Circle No. 105 on Postcard, Page 303

Fisher Research Laboratory, Inc.

The Type T-10 M-Scope is a new single-loop metal detector specially designed for locating small near-surface metal objects, such as valve boxes, survey pins, tools and property markers. Such metal objects can be detected beneath soil, rock, asphalt, cement, wood, brick, snow, ice and fresh water. Identification is made by a distinctive earphone tone as well as an indication on a visual meter. The instrument weighs only seven pounds.

Circle No. 106 on Postcard, Page 303

Fluid Packed Pump Company

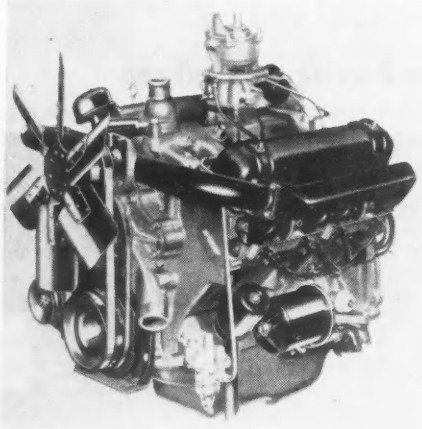
A Tungsten Carbide Ball is now standard equipment with the Oilmaster Super

Carbide Seat. The extreme hardness of the tungsten carbide ball and seat combination has eliminated the hazard of valve failure from abrasive damage or fluid wash. The high resistance to corrosion has made it suitable for use under all corrosive well conditions. The combination of hardness and corrosion resistance makes this a suitable valve unit in any hard-to-pump well. The Carbide Super Seat and Ball is available in the flat type only, in all API sizes from 1-1/16" to 2¾".

Ford Motor Company

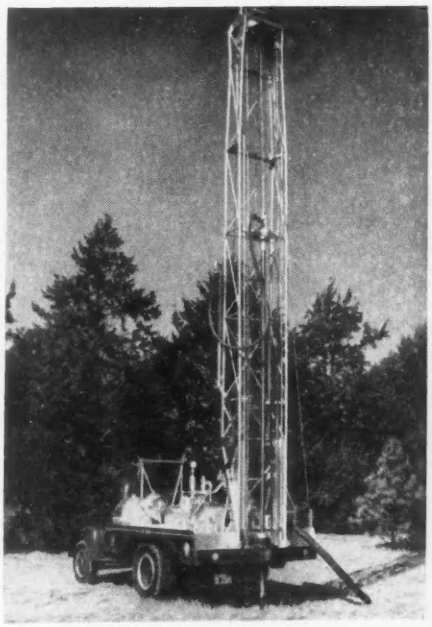
Three New Heavy-Duty Industrial Engines, the Ford "317" (pictured), "279" and "215" are equipped with overhead valves. Numbers identifying each engine correspond to its displacement in cubic inches. All engines have heavy-duty replaceable thin shell precision copper-leaded bearings. The oil system has a full-flow filter with renewable element that cleans all engine oil and reduces ring wear. The full-length water jackets completely surround each cylinder, simplify cooling and provide better temperature control. The "317" is rated at 140 brake horsepower at 2800 revolutions per minute. It is a V-8 with 3.8-inch bore and 3.5-inch stroke. The "279" is rated at 125 bhp at 2800 rpm. It also is a V-8 and has a 3.56-inch bore and 3.5-inch stroke. The "215" is a 6-cylinder engine rated at 93 bhp at 2800 rpm. It has a 3.56-inch bore and a 3.6-inch stroke.

Circle No. 107 on Postcard, Page 303



George E. Failing Supply Company

The "CFD-1" Holemaster is a self contained unit designed for fast shot hole drilling. The new drill has a rated capacity for holes to a depth of 1000 feet using 2-3/8-inch drill pipe. Two hydraulic motors actuate the kelly feed through chain drives. The high torque capacity fluid motors give the necessary power without reduction gear boxes, jaw clutches, or other wearing parts. The motors operate through chain drives to an equalizing jackshaft which assures even tension on all chains. The motors free wheel while pulling up for spudding and rod connections. The entire feed mechanism is controlled by one lever, and spring-mounted sheaves in the crown automatically maintain proper adjustment on the feed chains. The hydraulic drive affords a smooth feed and prevents over-stressing, stretching or breaking the

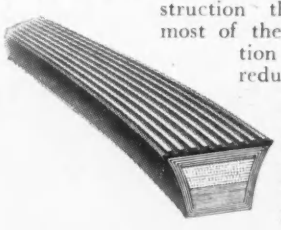


feed chains. All drilling controls are grouped at the driller's station. Breaking joints and adding drill pipe is accomplished in a matter of seconds, and is facilitated by the pivot-mounted back up tongs and roller type slips.

Circle No. 108 on Postcard, Page 303

The Gates Rubber Company Sales Division, Inc.

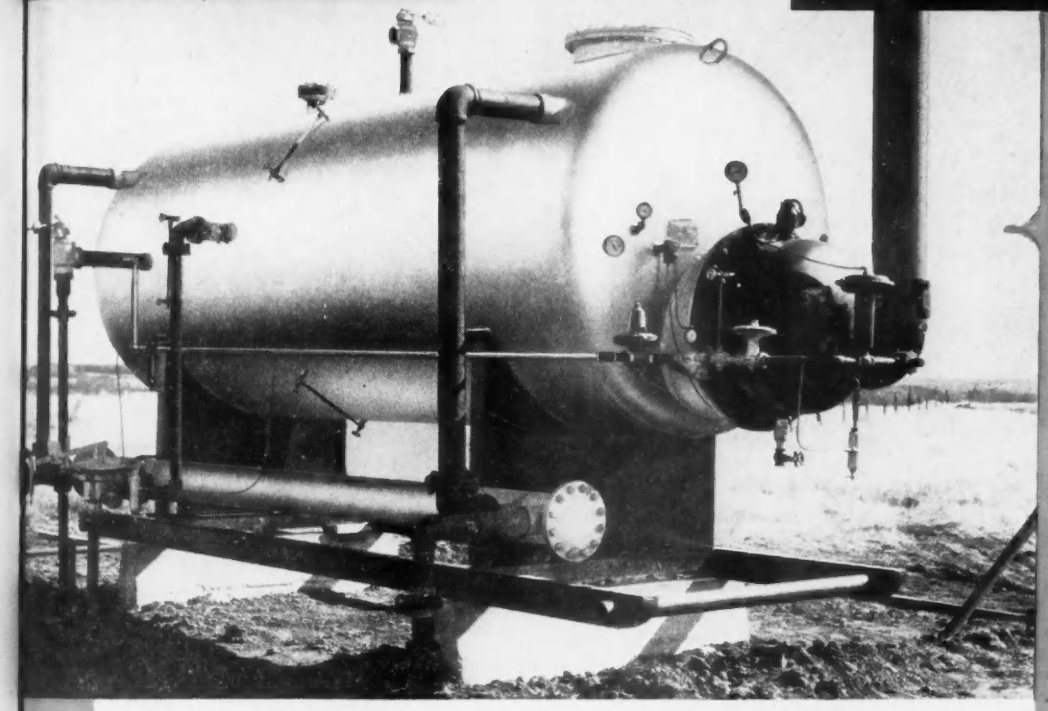
The Gates Rib-Top V-Belt for mud pump drives is built with a balanced construction that eliminates most of the lateral vibration and tends to reduce the excess whipping and flopping that may cause costly drive failures. To augment the balanced construction, Gates engineers built into the Rib-Top Vulco Rope extra resiliency, thus giving this oil field V-Belt the ability to take in stride all the terrific shock loads and pulsating operation of the mud pump.



Circle No. 109 on Postcard, Page 303

The only Horizontal Emulsion Treater* with a steam chest is manufactured by BS&B

Recognizing the need for a horizontal treater that will work, BS&B engineers came up with the answer in the Model HGT . . . field tested and accepted as a step in more efficient oil treating.



10 REASONS WHY A STEAM CHEST

A closed system requiring no make-up water . . . removable . . . built to A. S. M. E. requirements.

1. Eliminates the possibility of firebox burnouts.
2. Greater efficiency with direct heating of emulsion—no wasteful heating of wash water.
3. The settling section can be maintained at a constant temperature which allows better treating results with lower temperatures.
4. Larger oil settling space due to elimination of so-called "water wash", together with evenly maintained settling section temperatures, means higher capacities.
5. Lower temperatures and minimum heating of salt water will reduce corrosion.
6. Low "skin" temperatures on the steam chest minimize the chance of salt deposits and eliminates any possibility of "coking".
7. Expensive inspection of firebox is eliminated. Inspection for deposition on steam chest is necessary only when reduced heating capacity is observed. The steam chest cannot burn out.
8. Minimum heating of the salt water reduces troubles with deposits in siphons, water discharge valves, and water discharge lines.
9. Provides for convenient use of a steam preheater for situations involving badly foaming oil, severe paraffin conditions, etc.
10. High efficiency (70% overall thermal) immersion tube firebox operating safely in "distilled" water within the steam chest means less fuel gas consumed.

* Patents Pending

LARGE QUIET HORIZONTAL FREE WATER KNOCKOUT Horizontal flow offers a larger surface for separation of free water . . . which is removed without being heated, reducing heat load on the heating unit. Production enters the horizontal treater above the gas emulsion interface, allowing rapid separation of gas and reducing turbulence in the free water knockout section. Weirs control the oil-water and oil-gas interfaces. Hot gas produced in the **LARGE STEAM HEATING AND SETTLING SECTION** is mixed with cool gas from the free water knockout section, causing the heavier gas fractions to condense and be recovered in the oil . . . producing a higher gravity crude. A large filter bed aids in the final separation of the water and oil. Easily adjusted internal siphon controls the water level in the heating and settling section. The BS&B Horizontal Treater is portable when skid mounted. It's easily housed and insulated . . . controls conveniently grouped and located for piping and housing . . . each compartment can be drained separately without draining balance of heater.

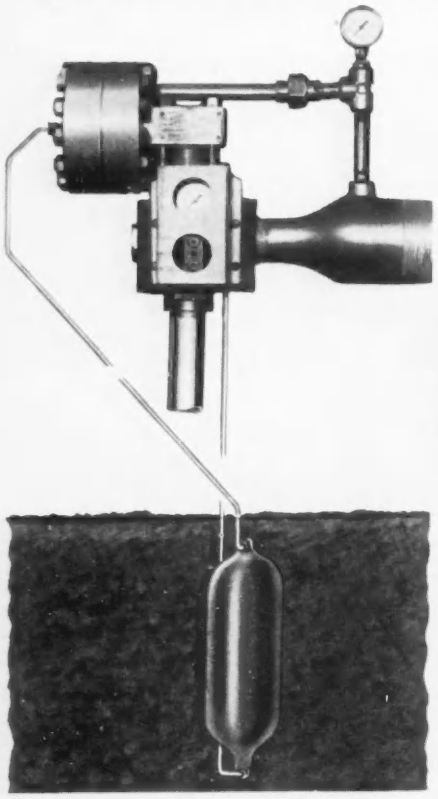
BS&B Horizontal Emulsion Treater available for delivery...Sizes—6'x14'—6'x21'—8'x21'—10'x21'...Auxiliary Units available for attachment to the Treater at factory or in field with minimum of time and effort.

EFFICIENCY BS&B RELIABILITY

BLACK, SIVALLS & BRYSON, INC.

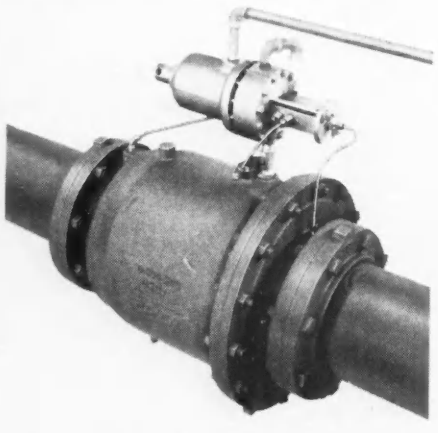
There's one of 35 BS&B Branches near you, if you're in the oil country . . . or write—
Oil & Gas Equipment Division, Department 1-B6

Grove Regulator Company



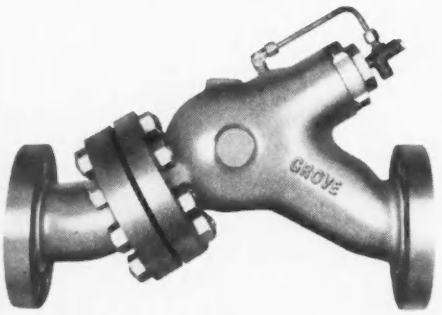
Grove Model PB-300 Pressure Regulator embodies in a new design the Grove Powreactor Dome principle with universal pressure range. The PB-300 is either a pressure reducing or back pressure regulator. No rearrangement of interior parts is required for the conversion. The Regulator may also be used as an automatic overpressure or underpressure shut-off valve. The PB-300 will handle pressures up to 6000 psi on reducing service, and up to 3000 psi on back pressure service. It is available with two-inch screwed or flanged connection. The new design of the PB-300 incorporates Teflon push-rod packing and Nylon diaphragm.

Circle No. 110 on Postcard, Page 303



The Grove Fullstream Check Valve provides downstream control for pipe line service, or integral control for compressor discharge or other pulsating services. The valve seat in this streamlined high pressure check valve is of extra length, and is sealed and supported only at its lower flange. The length of seat gives sufficient flexibility to resist the distorting effects of line strains and stresses. Leakage through the precision-finished valve plunger and guide bonnet is microscopic, and wear is negligible. Manufactured in 2 through 8 inch sizes for working pressures up to 6000 psi, it is available in straight-through and 90° angle patterns.

Circle No. 111 on Postcard, Page 303



The Grove Model 80-820 is a Flexflo expansible tube-type pressure reducing regulator with a special spring-loaded pilot. The pilot is available with a wide range of diaphragm and spring sizes, covering a range from 2 psi to 1200 psi reduced pressure. The Flexflo is basically a diaphragm-operated valve, with its only moving part being a flexible yet tough expansible tube which serves as both diaphragm and valve. Control is sensitive and positive, with a minimum of chattering and fluttering. The tube is unaffected by foreign matter or erosive wear. Available in sizes from 1 to 12 inches for working pressures up to 1500 psi and temperatures to 150° F.

Circle No. 112 on Postcard, Page 303

The B. F. Goodrich Company

New rayon "Grommet" V-belts are made by winding heavy rayon cord on itself to form an endless loop. Belt strength is uniform throughout, and there are no plies of fabric to stiffen belt and decrease ability to absorb shock. There is no splice, no stiff built-up section where cords overlap. BFG V-belts are made in humidity controlled factory to control moisture absorption of rayon during manufacture, and thus puts an end to "matching" problems sometimes met when sets of ordinary V-belts are installed on the drive.

Circle No. 113 on Postcard, Page 303

Highflex Rotary Drilling Hose is a flexible hose made for heaviest duty, deep drilling. It takes extreme bottom hole pressures, qualifies for Grade C (5000-pound test pressure) API, is crush-resistant and recovers from sudden shock or impact. It is reinforced with two plies of high tensile strength cabled wire and eight plies of extra strong square woven hose duck. Permalock couplings are standard with hose. Couplings are cast steel, heat-treated with hardened steel insert. Coupling is pressed on, permanently attached at factory, and will not move out of position at any pressure that hose can withstand. Hose ends are reinforced with several additional plies of wire and fabric to protect against bending stress at couplings.

Circle No. 114 on Postcard, Page 303

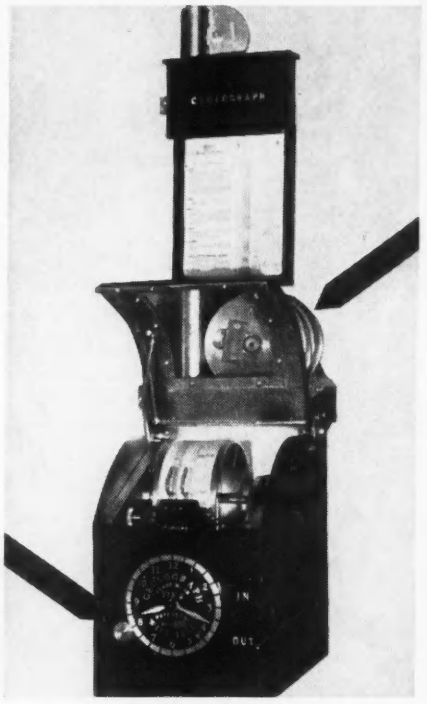
Barge-loading Hose with Flexseal Ends is a combination suction and discharge hose for inland waterway loading and unloading. Hose is flexible from flange to flange—there is no rigid nipple and flange assembly to reduce flexibility at hose ends. To provide a Flexseal joint, hose ends are built up to retain a split flange. Ends of hose make contact, compress and form a seal when flanges are bolted together. No gasket is required between ends. Alignment of bolts is not a problem since flanges rotate freely. One man can couple a length of hose to a fixed standard flange or to another hose length.

Circle No. 115 on Postcard, Page 303

The Geolograph Company, Inc.

The Geolograph Five-Foot Marker was devised for use in areas of rapid drilling where unconsolidated sediments may be several thousand feet thick. Due to the rapid rate of penetration individual foot marks may be partially superimposed on the time chart. Many companies have printed forms providing for logging the drilling time is five- or ten-foot units. To meet this need the Geolograph Five-Foot Marker converts the conventional one-foot marking Geolograph to a five-foot marking unit. After the Geolograph has been equipped with the five-foot marker it is only necessary to set the indicator dial on the front of the unit at the desired setting to secure either a one-foot or five-foot recording of drilling time on the chart.

Circle No. 116 on Postcard, Page 303



The Spring Recording Line Retriever is a compact, self-contained unit that fastens on top of the conventional Geolograph recorder. The recording cable passes from the reel down around the measuring wheel, back up to the pulley at the crown and down to the kelly. As drilling progresses the amount of downward movement is recorded on a strip chart. When the bit is raised from bottom the spring retriever automatically reels in the line. The spring retriever eliminates the necessity of stringing multiple lines in the derrick, and does away with the weight and guide line thus greatly simplifying rigging and dismantling the unit.

Circle No. 117 on Postcard, Page 303

an ACCO product

The BEST Line for Rotary Drilling ...TRU-LAY Preformed

● For each use there is *one best* wire rope . . . one that will stand repeated loading, abrasion, crushing, or continuous bending, and be the best to buy.

To achieve this, there is a TRU-LAY Preformed Wire Rope made in 6x19 Seale, improved plow steel with steel core for your equipment. This construction has the exactly right combination of strength, bending life, and resistance to wear and crushing that you need.

The one best drilling line . . . TRU-LAY Preformed . . . will last you longer and cost less to use. Specify and get TRU-LAY Preformed.

Write for folder DH-209.

Makers of ACCO Registered WIRE ROPE SLINGS

ACCO

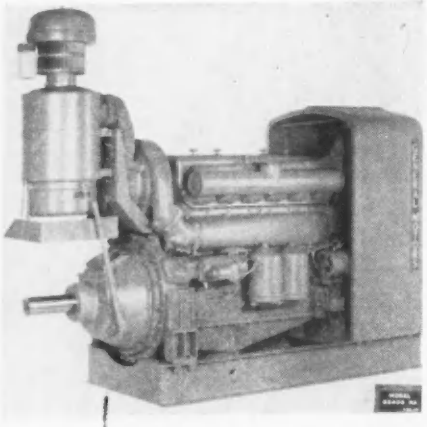
AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

Detroit Diesel Engine Division Of General Motors

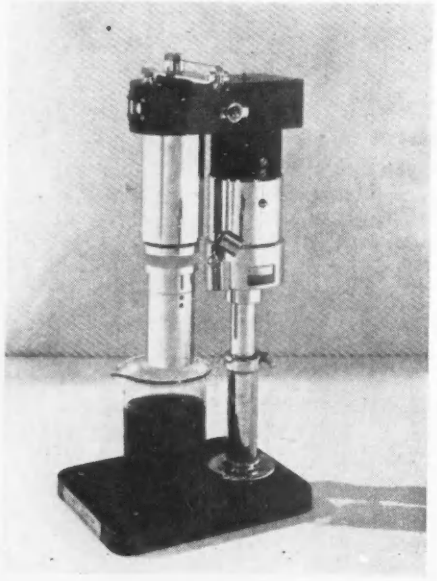
GM Model 6-110 Diesel engine is a six-cylinder two-cycle model with a basic engine rating of 275 brake horsepower at 1800 revolutions per minute. It provides a continuous usable bhp of 186 at 1600 rpm for well-drilling or mud-pump operation. The engine has push button starting and blower scavenging. The location of the centrifugal scavenging blower at the rear of the engine contributes to compactness. Cylinder block and head are one piece castings, symmetrical about a vertical plane between No. 3 and 4 cylinder. This allows reversal of block and head giving a choice of engine rotation and accessory locations. The engine is of heavy duty construction throughout. Wearing parts, such as cylinder liners, bearings, valve guards and inserts, are readily replaceable. It is available with General Motors Torque Converter which was designed specifically for the engine.



Circle No. 118 on Postcard, Page 303

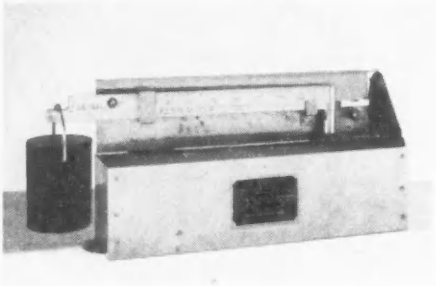
Geophysical Machine Works

The Fann Multi-Speed Portable Viscosimeter weighs only nine pounds and may be operated from a six-volt car storage battery. It is a rotational type instrument with five speeds, electrically driven, permitting sustained rates of shear for any desired period of time. Its measuring system employs a motor driven outer cylinder concentric with a stator. The fluid being tested occupies the annular space between the two, and when the outer cylinder is turned at a constant speed, exerts a torque on the stator which is proportional to the viscosity of the fluid. This torque is balanced to a null point by suspended weights. Models have straight line calibration at all speeds. A calibration constant is determined for each speed, and converting the load in grams to centipoises becomes a simple calculation. Viscosity range of the instrument is from 1 to 150 centipoises; gel strength 0 to 200 grams. Fann V-G meters provide rotor speeds of 200, 300, 400, 500 and 600 revolutions per minute.



Circle No. 119 on Postcard, Page 303

The Fann Mud Balance, Model 10 is operated by means of a counterweight balancing system measuring a predetermined small volume. It consists of a combination case and base, a beam graduated in pounds per gallon, a hard rubber mud sample cup, detachable cap, slide bar and counterweights. Its mounting case is designed so that the beam is protected from the wind and unnecessary handling. The complete instrument with case weighs only 2¾ pounds and dimensions are 3½ x 3½ x 12¾ inches. Its range is from 7 to 21 pounds per gallon. In operation, the hard rubber cup is filled with the sample the cap is replaced and the cup then placed on the beam after the beam is correctly positioned on the case. The slide is then moved until the instrument is in balance and readings are taken directly from the balancing arm.



Circle No. 120 on Postcard, Page 303

Grant Oil Tool Company

The Grant Vertical Casing Scraper is a two-way tool that can be rotated on the tubing string or operated vertically on a wire line to remove burrs, cement, mud cake, paraffin wax, or other restricting agents. It is designed to permit continued circulations while the scraping process goes on and its cutters are so spaced as to cover the full internal circumference of the casing. The cutters are hard faced and heat-treated. They are secured by an efficient locking device but are easily removed when necessary.

Circle No. 121 on Postcard, Page 303

The New Grant Reamer is a durable implement with a minimum of parts and is built for stabilizing, reaming out the hole to gull gauge, and for other reaming jobs. It is streamlined to allow uninterrupted flow of circulation fluid, and the cutters are so angled that weight must be applied to make the tool travel downhole. Consequently, it cannot corkscrew itself into the bore. The reamer is made to be run with either end up, thus extending the service life and obviating the need for subs. Although the locking assembly minimizes chances of losing cutters in the hole, worn cutters can be replaced easily at the rig. The reamers are made in 3-, 6- and 9-point styles and are capable of handling the full scope of cutter operations.

Circle No. 122 on Postcard, Page 303

The Safety Automatic Pressure Release has a diversity of applications in the oil industry. The release member is a plastic disc that disintegrates when the pressure rises above a predetermined limit, bringing about an immediate pressure drop. The disintegration takes place inside the valve, and therefore imposes no work hazard. New discs can be inserted quickly and it is impossible to put in more than one at a time. The device can be used to protect pumps, rotary hose, pipe, pipe fittings, and other equipment that may be exposed to excessive pressures. A two-inch model has bushings for protective limits up to any normally encountered pressure, and there is a smaller model made specifically for the geophysical trade.

Circle No. 123 on Postcard, Page 303

Greer Hydraulics, Inc.

A New Greer Hydro-Pneumatic Accumulator for oil well drilling absorbs shocks and vibrations created by mud pumps. The accumulator stops the constant snaking and jerking of the kelly hose, which in itself has the potential power to collapse a drilling rig. A new poppet design, built to withstand rugged duty during drilling operations, has a self-lubricating poppet valve to assure proper functioning at all times. Accumulator sizes range from 2 cubic inches up to 10 gallons to meet various oil field requirements. Connection may be made directly to the pump.

Circle No. 124 on Postcard, Page 303

General Electric Company

A New Oil Well Pumping Control has new design in magnetic starter, overload relay, motor disconnect switch and lightning arrester. A starting timer provides flexibility for starting motors after shutdown, and an improved time switch with new camriders for reliable time settings have been added to the control. The control will withstand voltage surges of 22 KV crest with a 1.5 x 40 wave, and 10,000 amperes current crest. The magnetic starter is a three-pole lift type with a strongbox magnet coil to protect the coil

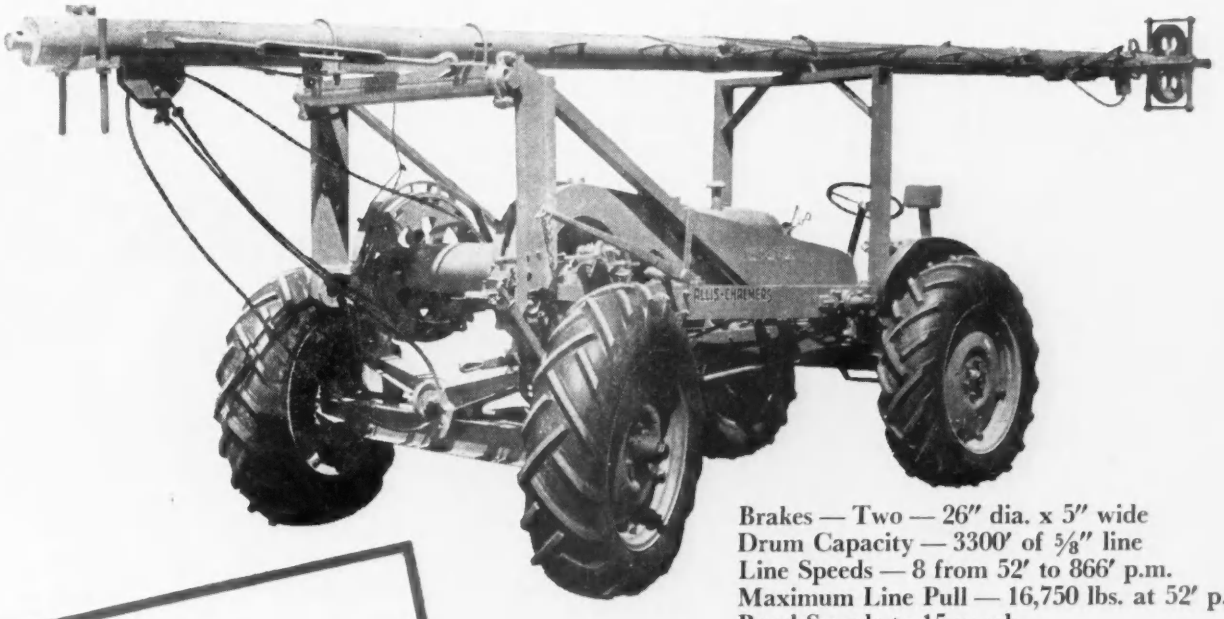
FRED E. COOPER INC. TULSA
HOUSTON · ODESSA · LOS ANGELES
DRAW WORKS
SPUDDERS
WINCHES
POWER UNITS

Model W-201 Tractors

A Low Cost, Complete Pulling Outfit for Wells to 3000'

Designed for rough going—Well balanced— Highly maneuverable—Fast.

These units have extremely high axle clearance—yet low center of gravity. Essential to safe operation in hilly country. When equipped with dual rear and mud front tires, these units will operate in the worst conditions of mud and sand. Single or double drum units. Jerk Line Spudder or Rotary Drive for clean-out, and Telescoping Masts are available. Seat Controls (standard equipment). Additional equipment: Front Controls, Metal Cabs, Catheads.

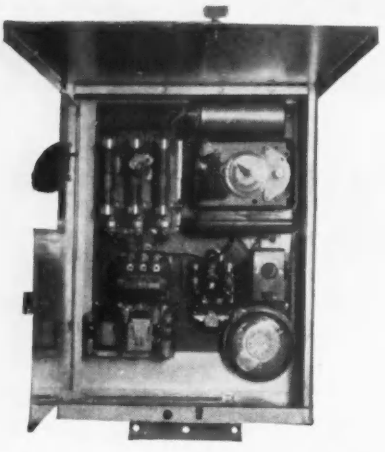


Brakes — Two — 26" dia. x 5" wide
Drum Capacity — 3300' of 5/8" line
Line Speeds — 8 from 52' to 866' p.m.
Maximum Line Pull — 16,750 lbs. at 52' p.m.
Road Speeds to 15 m.p.h.

Regardless of the depth of wells, there is a Cooper-Allis-Chalmers Winch of the right capacity to do the job economically.

FRED E. Cooper, Inc.

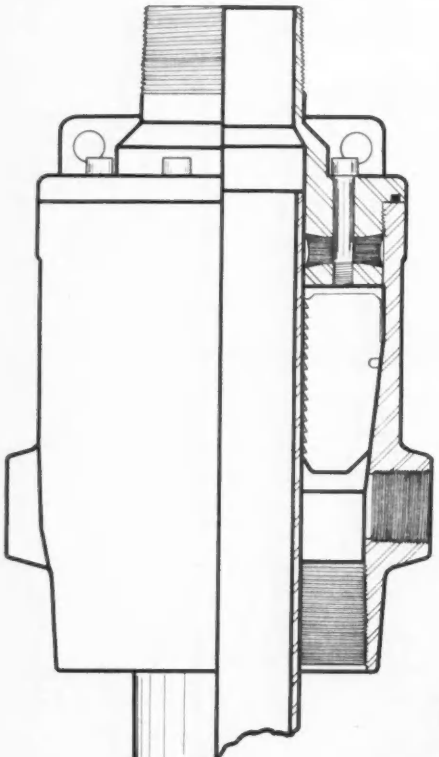
P. O. Box 1890 TULSA, OKLA.
Houston, Odessa, Los Angeles



from dust and dirt. Clamptype solderless terminals and solid silver contacts are used. A bi-metal isothermic overload relay has renewable interchangeable heater, hand or automatic reset and large solderless terminals. Any pole of the three-pole fusible disconnect switch may be removed for repair or inspection. New thyrite type lightning arrestor, metally enclosed, protects the timing relays.

Circle No. 125 on Postcard, Page 303

Hinderliter Tool Division, H. K. Porter Company, Inc.

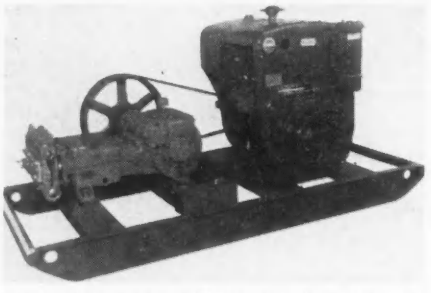


"Siamese" Casing Head and Tubing Head hookup is a compact unit which eliminates the nippling-up process. Installation is made by cutting casing, setting the "Siamese" and connecting the tubing head. The packing can be adjusted at any time and from the outside, without disturbing any element of the hookup. A new packing ring provides an effective seal with little applied pressure. There are no loose parts.

Circle No. 126 on Postcard, Page 303

Harley Sales Company

Wisconsin-Powered Oil Pump is designed to take care of oil field problems such as high pressure transportation of crude oil (high or low gravity, sweet or sour), salt water disposal, and pilot floods. The unit is made in two sizes, 30 barrels per hour and 50 bph at 1000 pounds. discharge pressure, the smaller unit being powered by a Wisconsin Air-Cooled field model (VF4, 20 hp) and the larger one by a Wisconsin VP4D (30 hp) power unit. Various accessories are available for these two units but they are both fitted with Stellite exhaust valves and seats, low oil out-off switches and lubricating oil filters especially designed for their low pressure



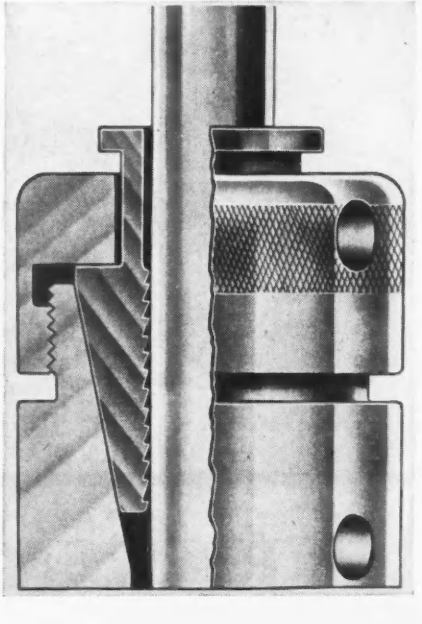
lubricating system. They can be operated on gasoline, natural gas or butane. The pump is a horizontal single-acting triplex with fluid end constructed of acid-resistant bronze with stainless steel fittings. Valves are flat disc type, spring actuated.

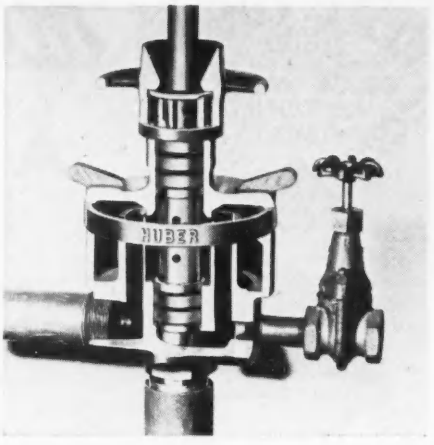
Circle No. 127 on Postcard, Page 303

J. M. Huber Corporation

The New Huber No-Bolt Polish Rod Clamp will handle any known sucker rod load, and has been successfully tested on loads up to 126,000 pounds. Though relatively small in size, the Huber No-Bolt Clamp has a wedging action which tightens its hold on the polish rod as the load is increased. The heavier the load, the tighter the hold. By using interchangeable slips, the clamp can be fitted to any standard size polish rod. Machined from cold-drawn, hardened steel, the No-Bolt Clamp is nickel-plated over copper. This heavy plating makes it rustproof and highly corrosion-resistant in all exposures. Over-all weight of the clamp is 11 pounds.

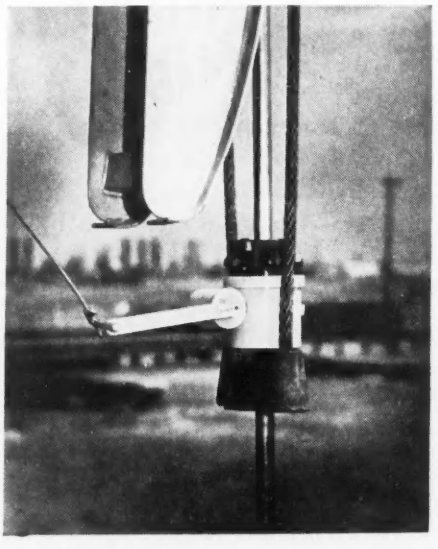
Circle No. 128 on Postcard, Page 303





The Universal Model HU Huber Rod Rotator makes possible automatic rod rotation with any type of pumping unit. With each reciprocation the Model HU rotates the sucker rod string a fraction of a turn. This rotation prolongs coupling life by equally distributing wear. It also equalizes wear on all surfaces of the working barrel of the pump. The Rotator is a wholly-enclosed all weather model which can be used in climates subject to ice and snow. The totally enclosed ratchet table operates in an oil bath; weather never interferes with rotation.

Circle No. 129 on Postcard, Page 303



The Combination Self-Lubricating Stuffing Box and Pumping Tee solves the problem of wear and burning out of stuffing box rubbers. Its unique design combines stuffing box and pumping tee so that no additional pumping tee is needed. Self lubrication by the stuffing box is gained by using a 1½ quart reservoir which automatically fills as oil is pumped. Oil from the tubing enters the reservoir; the overflow goes out the flow line, insuring that the reservoir is filled when pumping. When the well stops pumping, oil is still fed to the polish rod, keeping it lubricated for 24 hours or more. The unit is fabricated from cast steel, with removable top to facilitate cleaning. Designed for two-inch tubing, it can be had for 1⅛, 1¼ and 1½-inch polish rod. Standard stuffing box rubbers are used. Weight of the Combination is approximately 55 pounds.

Circle No. 130 on Postcard, Page 303

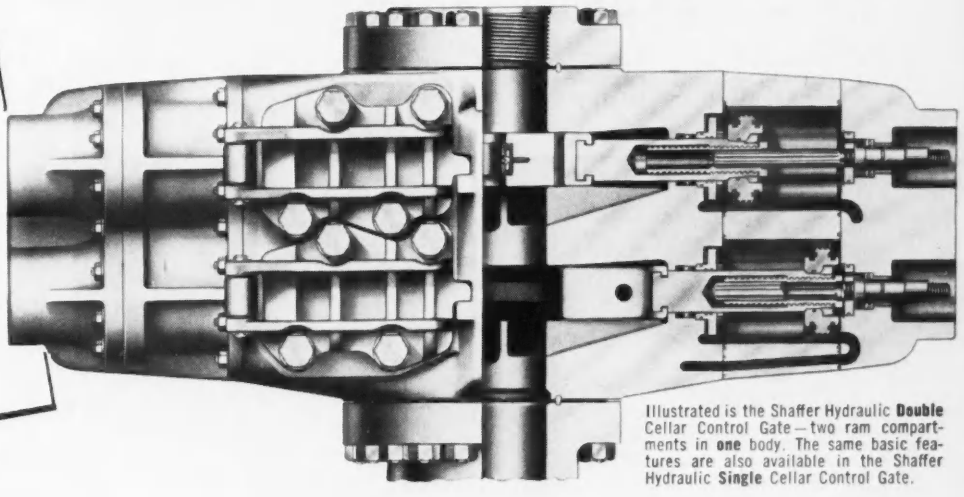
Before you buy any cellar control gates . . .

Compare

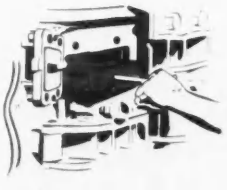
ALL OTHERS AGAINST THE MULTIPLE ADVANTAGES OF

SHAFFER HYDRAULIC GATES!

Before you invest in cellar control gates, make a feature-by-feature comparison of Shaffer Hydraulic Cellar Control Gates with any other similar equipment on the market . . .



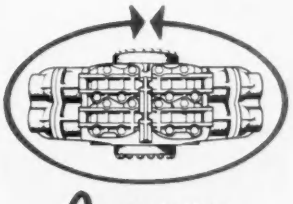
Illustrated is the Shaffer Hydraulic **Double** Cellar Control Gate—two ram compartments in **one** body. The same basic features are also available in the Shaffer Hydraulic **Single** Cellar Control Gate.



Compare

RAM CHANGES!

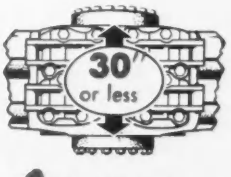
Changing rams in a Shaffer Hydraulic Gate is far simpler and quicker. Simply unbolt and open two doors, slide out the old rams, slide in the new—then close and bolt the doors. There's nothing to disconnect—and closing the doors automatically aligns rams for proper operation. Best of all, **complete ram changes can be made whether pipe is in or out of the hole!**



Compare

SEALED DESIGN!

In Shaffer Hydraulic Gates all moving parts—including piston rod ram shafts—are completely enclosed within the Gate body. There are no exposed moving parts to become wedged or damaged by objects falling into the cellar—nothing to become corroded by chemical or salt drippings. Even the locking shaft is non-rising—fully protected!

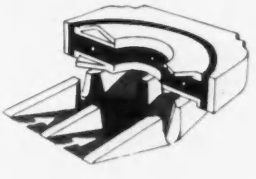


Compare

COMPACTNESS!

The Shaffer Hydraulic Double Cellar Control Gate contains **two** ram compartments unitized into **one** body . . . and even in sizes as large as 13⅜" (12" series 900) **requires only 30" total height.** Smaller sizes even less!

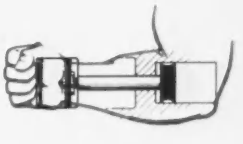
Compare these cellar-saving, space-cutting measurements against comparable equipment.



Compare

INTERNAL SAFETY!

With Shaffer Gates you don't have to worry about mud or sand interfering with free ram travel. The rams travel on high narrow guide ribs above the steeply-sloped ram compartment bottoms. Mud and sand quickly drain back into the well—with no detrimental accumulations to interfere with ram operation!



Compare

OPERATING SIMPLICITY!

Simple design means simpler maintenance, more trouble-free operation. Note how the operating cylinders in Shaffer Hydraulic Gates are **directly behind** the rams and operate through a rugged **one-piece** connection. No complicated multiple-element connections to wear or jam!

By making such a comparison you will readily see why these and still other important advantages engineered into Shaffer Hydraulic Cellar Control Gates make them, by far, the outstanding choice for protection against pressure emergencies. In fact, on every point essential to modern cellar control gate protection, this unit is unsurpassed.

See your nearest Shaffer representative for complete details—or write direct!

Write for a free copy of the 1951 Shaffer Catalog!

See the Shaffer section—pages 4525 to 4600 of your 1951 Composite Catalog!

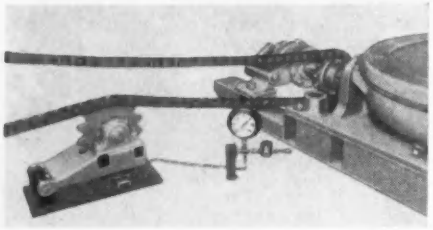
29 years OF OIL TOOL LEADERSHIP

SHAFFER

HIGH PRESSURE DRILLING AND CONTROL EQUIPMENT • FISHING TOOLS THAT EXCEL

SHAFFER TOOL WORKS, Brea, California • California Service Shops: Santa Fe Springs and Taft
HOUSTON, TEXAS, 6006 Navigation Blvd. • ODESSA, TEXAS, 1925 West Second Street
OKLAHOMA CITY, OKLAHOMA, Acme Oil Tool Company, 1001 S. E. 29th Street
CASPER, WYOMING, Shaffer Tool Works, Post Office Box 1788
EXPORT SALES OFFICE: Shaffer Tool Works, 500 Fifth Avenue, New York, N. Y., U.S.A.

Hunt Tool Company

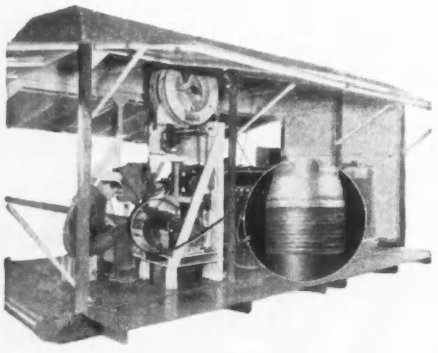


A New Torque Indicator for power rigs consists of a hinged sprocket assembly, diaphragm, hydraulic gauge and hand pump. The indicator sprocket is positioned so the rotary chain rides on it, and any change in torque is reflected by more or less pressure on the sprocket assembly against the diaphragm which passes the pressure change along to the gauge. The indicator assembly may be used on any type power rig and chain guards, with or without oil bath.

Circle No. 131 on Postcard, Page 303

The Hunt Hydraulic Pulling Tool is designed especially for pulling packers and liners in one trip without putting pulling strain on the drill string or tubing. It attaches to the bottom of the tubing or drill pipe and provides high pulling capacity directly above the fish. All the strain is taken by the tool, none is transferred to the casing string. This new tool has three parallel operating slip segments which set the tool firmly in position. After the slip is set, hydraulic pressure provided by a surface pump provides a breaking out pull far more powerful than the drill string could support. When the fish is free, the slip is collapsed and the fish is lifted out by the drill string.

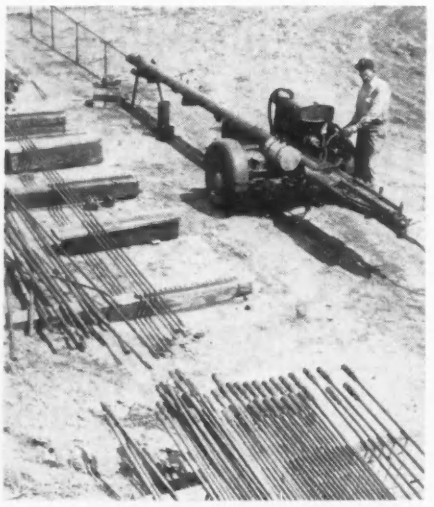
Circle No. 132 on Postcard, Page 303



The Hunt Automatic Welding Machine is designed primarily for hardfacing the outside diameters of tool joints and drill collars. It is portable and is transported in a float truck so that it may be set off right at a well and the work done on the spot. It hardfaces the o.d.'s of the tools automatically and continuously. First the tool joint is preheated, then a high chromium rod is applied. Then tungsten carbide is applied in the valleys of the first weld. The machine provides a smooth, tough weld and does not set up internal stresses in the tool joints.

Circle No. 133 on Postcard, Page 303

Heldie's Machine Works



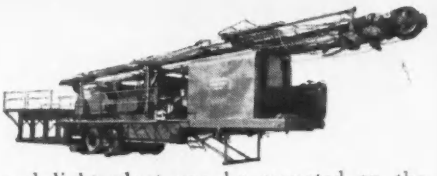
A Universal Tester and Straightener for both rods and tubing is actually a portable hydraulic tensile testing machine. In straightening rods, the new method consists of the following steps: (1) Coupling and pin threads and faces are buffed, cleaned, and inspected. (2) The rods are tested for the yield strength and the condition is indicated by the yield point and the behavior of instruments at the moment of yield. (3) If the rod is crooked, it is straightened by this loading to yield. (4) All usuable rods are graded, marked and the joints are lubricated and taped. Bad rods are marked as such. Since the applied load and elongation is closely controlled, the small amount of elongation past the yield produces a slight amount of cold working which should be beneficial.

To straighten badly corkscrewed tubing, threads on both coupling and pin ends are chased with taper following chasers, brushed with rotary brushes, inspected, lubricated, and taped. Tubing, threads, and couplings are then tested for yield and condition in the same manner as described for sucker rods and at the same time, the joint is straightened. If desired, a hydrastatic pressure test can be performed on each joint of tubing while loaded to yield. Finally, the joints are graded, marked, and bad joints are discarded. A joint straightened with the new hydraulic machine leaves the metal structure uniform and equally stressed throughout the length of the joint.

Circle No. 134 on Postcard, Page 303

Henderson Welding Works, Inc.

Trailers for use with workover and shallow drilling rigs, mounted with 65- or 87-foot double leg mast poles, are designed to fit the individual operator's need. The trailer has built-in air tanks for air tongs, leveling devices, walkways, etc. Tool house

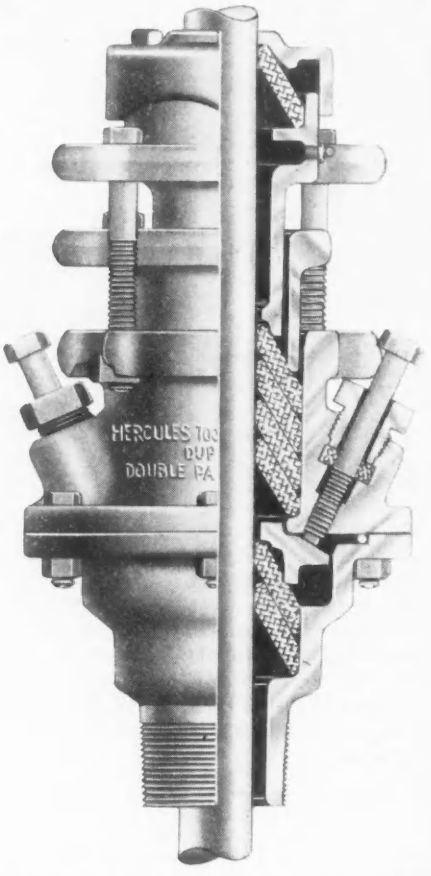


and light plant can be mounted on the trailer, or the space may be used for pump or carrying substructure when the rig is being moved. Substructures are made to use with the trailer, and are designed with removable rotary support beams. All beams are removable to allow the substructure to be skidded on or off wellhead connections. Provision is also made for transporting the rotary and blowout preventer within the substructure. A packaged unit with drawworks and mast is provided.

Circle No. 135 on Postcard, Page 303

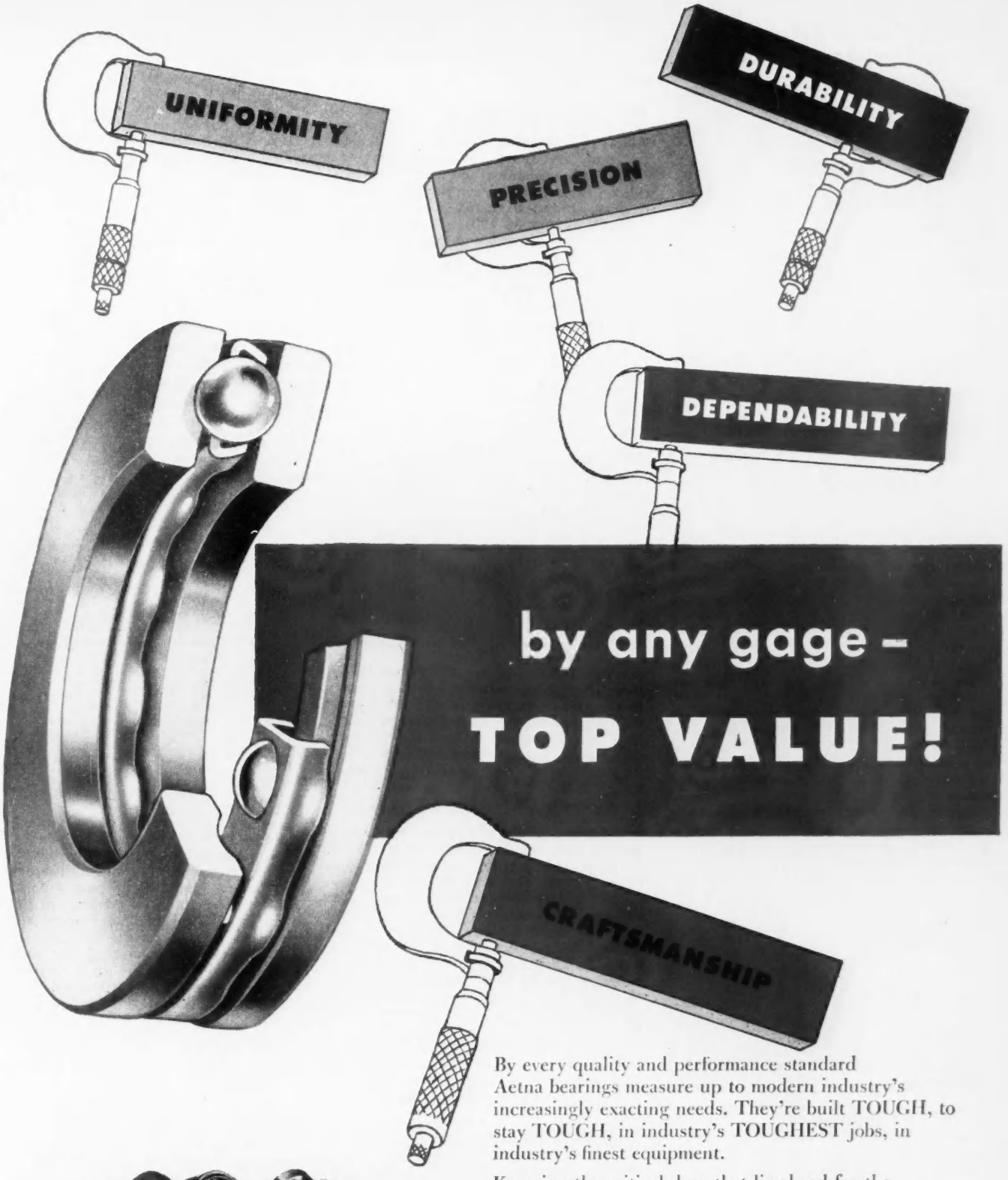
Hercules Tool Company

Hercules Double Packed Type DP duplex polished rod stuffing box with lubricating upper gland has been designed for use on wells that flow intermittently and especially on wells near towns, camps and homes. On the improved model, flanges on the body and base are constructed heavier to withstand greater pressure. Space between flange is packed off with an O-ring seal. The two compression bolts, which are used to help pack off the lower section of the stuffing box, have been provided with a cotter pin which eliminates the danger



of these two bolts being unscrewed too far and being blown out of the box. Lubricating gland helps to eliminate excessive wear on the Polished Rod and Cone Packing and helps to reduce friction to a minimum.

Circle No. 136 on Postcard, Page 303



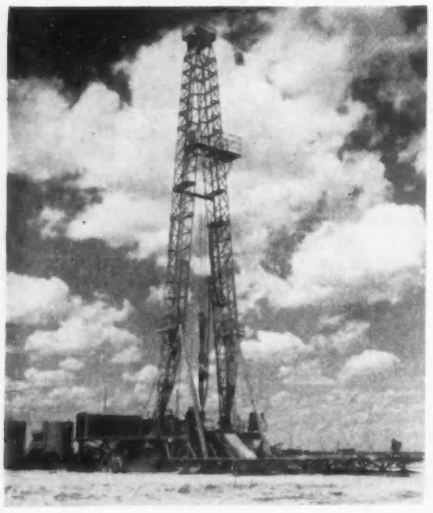
By every quality and performance standard Aetna bearings measure up to modern industry's increasingly exacting needs. They're built TOUGH, to stay TOUGH, in industry's TOUGHEST jobs, in industry's finest equipment.

Knowing the critical days that lie ahead for the equipment YOU make or use, it stands to reason you'll place more emphasis on the quality of the bearings you buy and the anti-friction engineering service you employ. In that direction we have no better sales talk to offer than the fact that we serve the Nation's foremost manufacturers—that 80% of our business comes from firms we have served for 20 or more of our 36 years.

Standard and Special Ball Thrust Bearings • Angular Contact Ball Bearings • Special Roller Bearings • Ball Retainers • Hardened and Ground Washers • Sleeves • Bushings.

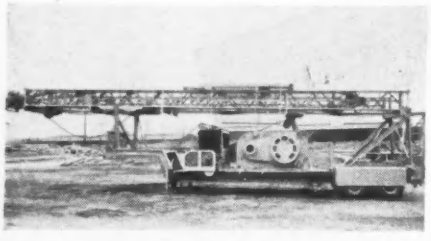
AETNA BALL AND ROLLER BEARING COMPANY
4600 Schubert Avenue • Chicago 39, Illinois

IDECO, A Division of Dresser Equipment Company



Ideco Full-View Mast is an A-frame structure held in the upright position by a pair of auxiliary legs which serve also as a part of the raising mechanism. No guys are required and no braces or girts obstruct the driller's view of the traveling block or derrick man. Wide-spread legs permit use of any type or size drilling rig and provide clear space around cathead. Drilling floor measures 24 feet from drawworks to pipe ramp and 27 feet, 8 inches from side to side. Mast obtains stability from wide-spread legs, together with latticed-box construction of the two main mast legs. Raised by means of traveling block, the mast is pushed to drilling position by a pair of raising legs, pivoted at ground level. Automatic safety locks are engaged by roller shafts as the mast approaches vertical, holding it in an upright position It is further secured by manually operated lock jacks. Three types, up to 143-foot height with 600,500-pound net hook capacity, are available.

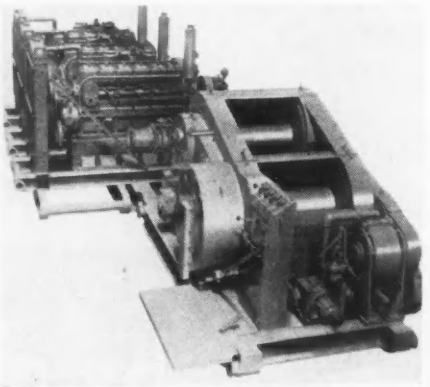
Circle No. 137 on Postcard, Page 303



Type "C" Kwik-Lift Mast, used in conjunction with the Ideco Rambler rig, is used for servicing, workover and shallow drilling. When mounted on a truck or trailer with drawworks and engine, the rig will meet most road weight restrictions. Road width is less than eight feet, and height less than 12 feet, 9 inches. In the over-the-road position the total mast depth is only 30 inches from front leg to rear edge of the portal girt. Type "C" is a twin-column, latticed, telescoping structure. It is designed to be transported from well to well without disassembly. The block always remains strung in the mast ready for immediate use at the next location. When desired, the mast can be set up and detached from the vehicle, releasing the hoist for work under a standard derrick.

Circle No. 138 on Postcard, Page 303

Ideco H-M 750 Series Drilling Rigs are for drilling to 8000 feet with 4½ inch drill pipe when powered by two or three engines developing a total of 750 horsepower. They are available in two models, the H-750 and the M-750. The M-750 is a mechanical drive drilling rig and the H-750 is a torque converter drive drilling rig. Both are designed to be converted easily from mechanical to torque converter rigs or from torque converter rigs to mechanical rigs, without major design changes. H and M 750 rigs can be furnished with two or three engine chain compounds. Shafts are of alloy steel and operate in self-aligning roller bearings. Airflex clutches serve as flexible couplings and act as engine disconnects. The compound drive is enclosed in an oil-tight case. The pump drive is connected to the com-

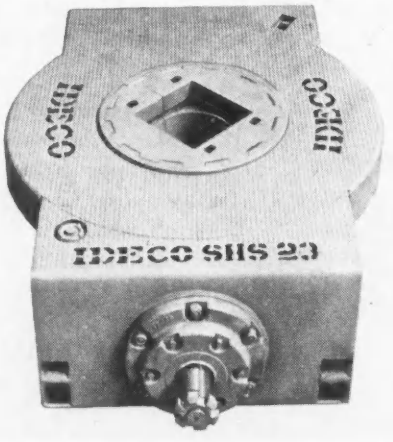


pound through an air clutch controlled from the driller's position. A short center three-engine compound is available for use with torque converters and narrow width, high speed engines. With this compound the drawworks, compound and engines can be moved as a single package, as over-all length is only 32 feet, 10 inches.

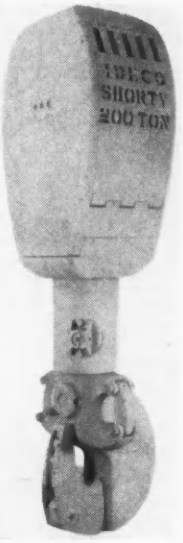
Circle No. 139 on Postcard, Page 303

A Splined 23-Inch Rotary Table added to the Ideco line, is available in both short (44-inch center) and long (53¼-inch center) sizes. The center of the table is splined to provide a greater driving area and facilitate engagement of the kelly drive with the table. Large table opening and unusual table bushing permit use of standard slips. Smaller driving ring provides added safety for crew because it permits them to work closer to the table opening without stepping on a rotating part. Table is completely oil-bathed and has one-point lubrication for both table and pinion capsule. Lubrication system force-circulates oil throughout all bearings.

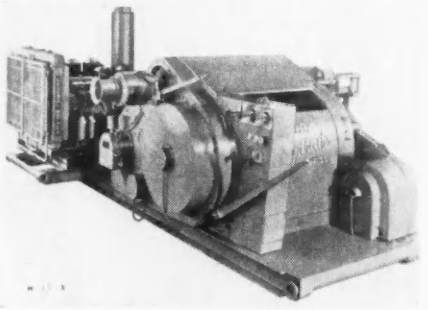
Circle No. 140 on Postcard, Page 303



A 200-Ton Capacity Block has been added to Ideco's regular line of Shorty Blocks for drilling and servicing masts. Shorty Blocks are unitized assemblies which combine the block, spring loaded link adapter and swivel bail hook into a short, compact assembly. Added head room provided by this design permits faster operation as the pipe may be hoisted safely at full speed to the top of the run. The 200-ton capacity model has 36-inch Fabriform sheaves, which are dynamically balanced for smooth operation. The 200-ton block has a hydraulic cushion return that eliminates snap and jar of the hook. Other Shorty Blocks are available in 125-ton and 65-ton capacities.



Circle No. 141 on Postcard, Page 303



Ideco H-335 Hydrair Hoist is a one- or two-engine 350-horsepower rig which provides many refinements usually found only on larger rigs. Its equipment includes air clutches on high and low speed drives to main drum; torque converter drive; oil bath for all chain drives; large brakes; Hydromatic brake engaged by direct air clutch; catshaft disconnect clutch; big main drum (optional sandline drum in standard or extra large capacity); chain or propeller shaft drive to rotary table; fingertip air controls; and pressure lubrication of all shaft bearings. The H-35 is available with a mud pump drive and can be furnished skid mounted or as a part of a Rambler Rig complete with a Kwik-Lift Mast. The H-35 series is rated for drilling to 5000 feet with 4½ inch drill pipe, and for workover and servicing to 13,500 feet. A special deep well workover and servicing H-35 model is available for workover and servicing to 16,400 feet.

Circle No. 142 on Postcard, Page 303

The F12-DA114 Pumping Unit has polished rod load capacity of 11,600 pounds and is fitted with a double reduction herringbone geared speed reducer with an API peak torque capacity of 114,000 inch pounds. It's Ideco wheel-type, counterbalanced crank, has a maximum stroke of 54 inches. It features a rigid four leg samson post, a new rigid welded sub-base under the speed reducer, and a shock-proof pitman equalizer as-

HOLD ANY PACKER DOWN

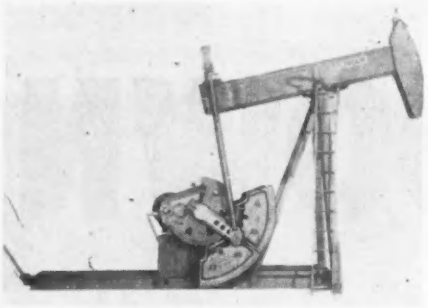
. . . With a Guiberson Hydraulic Anchor

The Type "H1" Hydraulic Anchor is recommended for use with all Guiberson production-type packers — or any other comparable production-type packer — as a positive means of holding the packer and tubing down while the well is pressured below the packer, as in acidizing or formation-fracture processes. It is also recommended for use in anchoring the tubing and packer in gas or water injection wells where the tubing pressure will exceed the casing pressure. The "H1" can be effectively used as a Hydraulic Anchor to keep the tubing from "breathing" in pumping wells having low working fluid levels.

Simplicity of design and completely automatic operation make the "H1" exceedingly easy-running, easy-pulling — it may even be run upside down without the slightest effect on its operation. Case hardened piston slips in Monel inserts assure positive action and maximum corrosion resistance. Piston slips operate independently and provide equal distribution of gripping force against the casing I.D. with no localized high pressure areas. This, coupled with a limited piston slip stroke, positively precludes swaging or damaging casing in any way. Piston slip gripping area is 100% effective in any weight casing within the anchor size range. "H1" anchors are individually tested and will hold any pressure the tubing will stand.

TYPE "H1"

THE
GUIBERSON
CORPORATION
ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.
Sold By Leading Oil Field Supply Stores Everywhere



sembly. The speed reducer is fitted with herringbone gears and all shafts are carried on roller bearings. Lubricants is filtered with magnetic oil sump and labyrinth seals on all shaft extensions.

Circle No. 143 on Postcard, Page 303

The New F16-DA114 Pumping Unit has a polished rod load capacity of 15,900 pounds, and a peak torque capacity of 114,000 inch pounds. It has the Ideco wheel type counterbalance crank, a rigid four legged samson post, a sturdy, welded sub-base under the reducer and clamp type pitman connections. The speed reducer is fitted with herringbone gears and all shafts are carried on roller bearings. To assure a continuous supply of clean lubricant it is fitted with a magnetic type oil sump and labyrinth seals on all shaft extensions.

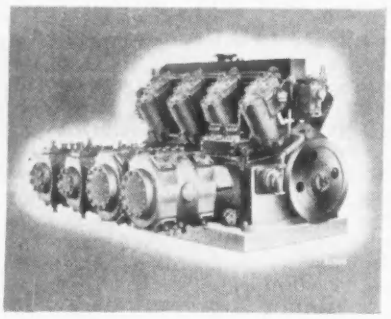
Circle No. 144 on Postcard, Page 303

International Harvester Company

The U-1091 Engine, designed for powering drawworks, pumps and generator sets, is a six-cylinder natural gas engine with a 1090.6 cubic-inch displacement, a cylinder bore of 5¾ inches and a piston stroke of seven inches. Developing 180 net horsepower, the engine has a compression ratio of 7.5 to 1 and a piston speed of 1604 feet per minute at the rated 1375 revolutions per minute. It is equipped with a fly-ball type, variable-speed governor. The U-1091 power unit is regularly equipped with standard base, clutch, power takeoff and standard controls and instruments. A gasoline starting tank and a combination carburetor for starting on gasoline is also available when required. Attachments for the engine include a water-cooled manifold, auxiliary water pump, long skid base, extended shaft and outboard bearing, magneto ignition, top cylinder oiler and air cleaner pre-screener. The U-1091 can also be equipped for operation on liquid petroleum gas.

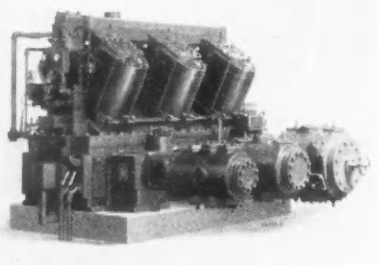
Circle No. 145 on Postcard, Page 303

Ingersoll-Rand Company



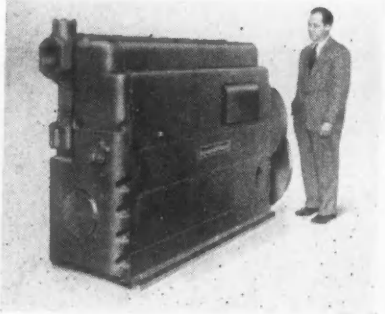
The JVG gas-engine-driven compressors are available in three sizes—110, 165 and 220 horsepower. These machines consist of 4, 6, and 8 power cyclinders, having an 8¼-inch bore and a 9-inch stroke with two power cyclinders for each compressor frame. The JVG is a compact compressor of the four-cycle, V-angle design, having the power connecting rods articulated with the compressor rods. It is a "packaged" version of the first angle-type gas-engine-driven compressor originated by I-R in 1932. The JVG is light enough to meet requirements for semi-portable use.

Circle No. 146 on Postcard, Page 303



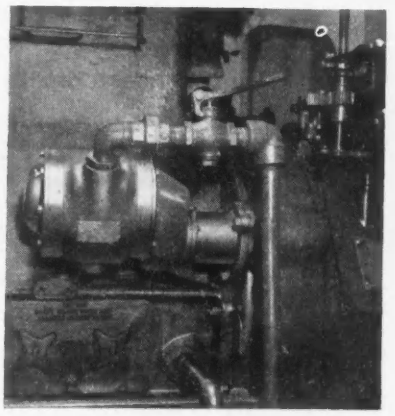
The SVG V-angle gas-engine-driven compressor is built in two sizes, 330 horsepower with six cylinders and 440 hp with eight cylinders. Crank angles of 120 degrees on the six-cylinder unit and 90 degrees on the 8-cylinder unit, two power cyclinders per compressor frame, lightweight aluminum power pistons with low inertia forces, and shaft counterweighting are incorporated in the SVG. A saving in fuel has been secured by increasing the compression ratio. Oil consumption is lower because of cool-running aluminum pistons, narrow piston rings and chrome-plated top rings. Necessary controls and valves are grouped at the operating end.

Circle No. 147 on Postcard, Page 303



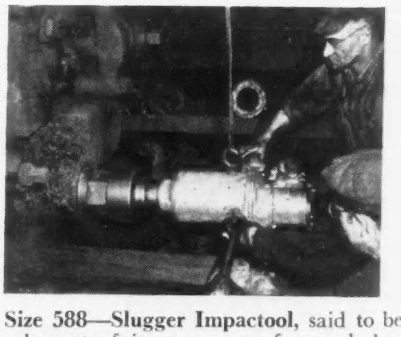
Type TS Diesel Engines are small-sized, heavy-duty engines available in the 195-375 hp range. The TS diesel is a four-cycle, single acting engine, with a seven-inch bore and 8½-inch stroke, weighing about 30 pounds per horsepower. Fuel consumption is 0.40 per horsepower-hour. Wet-type replaceable cylinder liners, individual heads with overhead valves and valve-seat inserts are used. Pistons are aluminum alloy of the thick-wall, long-skirt type. Piston pins are full-floating. Main and crank-pin bearings are aluminum alloy, both full floating and interchangeable. The supercharger is the gear driven mechanical type. Two fuel spray nozzles are used per cylinder. The engine is full-pressure lubricated. Normal starting is by 250 psi air, although other means of starting can be furnished.

Circle No. 148 on Postcard, Page 303



Air Starting Motors in sizes 9 BM and 20 BM are offered by Ingersoll-Rand. Size 9 BM develops up to 16 horsepower and requires 7 cubic feet of air per start. Size 20 BM develops 41 hp and requires 16 cubic feet of air per start. The 9 BM weighs 40 pounds, the 20 BM—103 pounds. These cranking motors are suitable for cranking diesel or gasoline engines with piston displacement up to 3500 cubic inches. Construction consists of a Multi-Vane air motor which cranks the engine through a Bendix drive designed to match the performance characteristics of the air motor. The air motor consists of a solid, hardened-steel rotor, revolving in a cylinder of wear-resistant alloy, and enclosed by bronze end plates.

Circle No. 149 on Postcard, Page 303



Size 588—Slugger Impactool, said to be the largest of its type manufactured, has been designed for extremely heavy bolting-up jobs such as were formerly handled by sledging or battering type wrenches. The "Slugger" has a capacity for setting bolts up to the four-inch size. It is capable of handling both maintenance and production work, and has been especially designed for the rapid repair of heavy equipment involving the use of large studs, bolts or nuts. The tool weighs 215 pounds, has a free-speed of 355 revolutions per minute with 550 impacts per minute, and operates with a 2½-inch square driver. The overall length to the shoulder of the anvil is 26⅝ inches and the side-to-center distance of the hammer case is four inches.

Circle No. 150 on Postcard, Page 303

"There Just Isn't Any Upkeep"

Says Superintendent Carl Young of the L. B. Jackson Company, Tulsa

NO TIME CLOCK FOR U-2. This International U-2 has been pumping oil five years without a failure.

Four International engines installed on the Brown Lease, Creek County, Oklahoma, five years ago are still pumping oil daily and have never had a mechanical failure.

"These International U-2s are wonders to operate. There just isn't any upkeep," Superintendent Carl Young points out with pride.

And they do a good pumping job, too. That's why Carl's so strong for International U-2s, why he now has forty of them pumping for him on various leases.

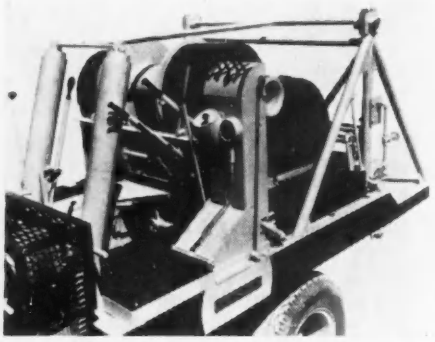
Get the facts and figures on how International power can perform for you. See your International Industrial Distributor, Power Unit Dealer or oil field supply house.

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILL.

INTERNATIONAL INTERNATIONAL HARVESTER **POWER THAT PAYS**

Joy Manufacturing Company

Joy Series 300 Motorized Drill Rigs, for slim-hole production drilling and deep



core-testing to 5000 feet, have been substantially improved with a new control panel and, as optional equipment, an 87 foot telescopic mast. The new location of the control panel places the driller in a safe, commanding position amidships, facing the rear. This eliminates congestion around the rotary, contributing to the safety and efficiency of the crew. The new, 87-foot mast (optional on Model 350) telescopes for easy portability and handles 60-foot stands. It has a rating of 80,000 pounds and is raised and lowered by hydraulic operation. A safe, obstruction-free working area around the rotary table provides plenty of space to handle tongs. Accessible tie-down bolts on deck permit quick removal of the table. Two types of rathole drillers are available, permitting this operation without removal of the table. A new feature of the Model 350 is a compound coupling that transmits engine power to the main drive shaft, permitting single or compound drive forward to draw works and table, and backwards to the mud pump.

Circle No. 151 on Postcard, Page 303

Johns-Manville

Uneepac is a new molded automatic ring packing—each ring is a complete, self-contained packing unit. It is designed for maximum sealing in minimum packing depth so stuffing box sizes can be reduced. No follower or header rings are needed and each ring centers itself on the preceding ring. In service, each lip is always exposed to fluid pressure to provide instantly responsive, positive sealing and, since Uneepac does not depend on gland pressure for sealing, friction is reduced and there is less wear on both rod and packing. It is offered in varied compositions to suit different services—water, steam, oil, air, gas, vacuum, etc. Endless or split rings are available for shafts 5/8-inch diameter and up.

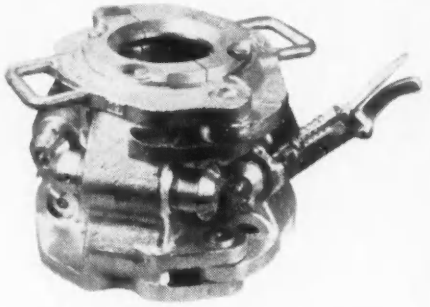
Circle No. 152 on Postcard, Page 303

Kinzbach Tool Company

The Model 112 Safety Relief Valve provides automatic, nonchatter, snap-open, snap-shut action. The valve snaps open for instantaneous relief at full volume and a pressure less than overload pressure holds it open until a predetermined pressure drop causes it to snap shut and restore circulation. This permits quick changing of pressure settings. Within a normal range adjustments may be made by changing the detention wedges. All critical elements are made from corrosion-resistant materials or are given anticorrosion treatment.

Circle No. 153 on Postcard, Page 303

The Kinzbach Automatic Tubing Spider employs parallel-operating linkage for gripping and suspending the tubing instead of conventional conical wedges. A single lever control actuates all segments simultaneously and in proper relation. Then the operator may take a safe and relaxed position to reach the elevators while operating the spider with one hand. The action is accomplished by the use of bevel-gear quadrants connecting the ends of the cam shafts. The control lever is attached to one of these gears. An indexing pin, operated by a squeeze grip on the control lever, permits locking the segments positively in engaged or disengaged position. By the use of parallel cams as load connectors between the segments and the spider body, it is possible to hold all segments in alignment with the tubing at all times and to maintain a gripping force which is proportional to the load. This force, is transmitted from the segments,



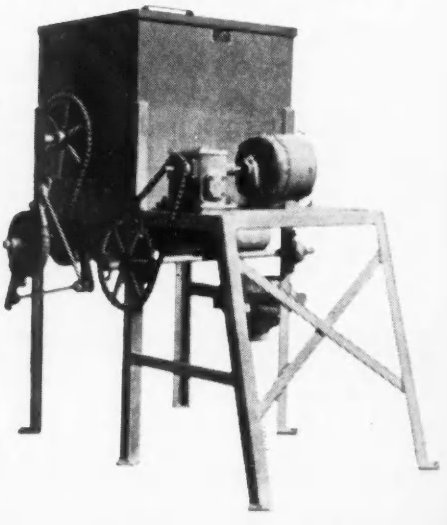
through the cams to the body. True radial closure of the segments about the tubing is obtained through movement of the cams. The Spider is available for tubing sizes from two through three inches.

Circle No. 154 on Postcard, Page 303

Keystone Supply Company

Western Chemical Feeders are made to order in various sizes, with electric motor, gas engine or water wheel drive. Model shown has agitator inside hopper for lime or other light chemicals. Feeder is also available with a baffle for feeding free-flowing granular materials such as ground aluminum sulphate. Spiral mixing bowls on either type aid in putting chemical into solution. Use of solution tank in conjunction with the chemical feeder econmically handles ferric sulfate, activated carbon or other chemicals ordinarily difficult to dissolve. Feeders are controlled by adjustment of eccentric on idling shaft to engage more or less teeth on the auger drive-shaft. The feeder is adjustable from a few pounds to several hundred pounds of chemical per day. Feeder is built with right-hand or left-hand feed to conserve space where two chemicals, such as lime and alum, are fed into the same system.

Circle No. 155 on Postcard, Page 303



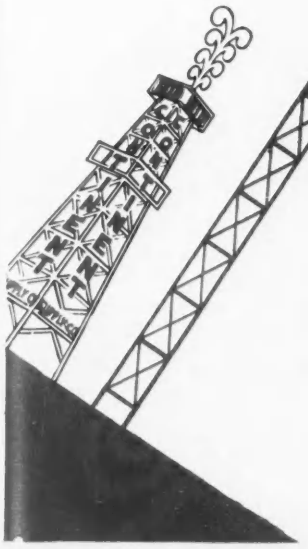
Another MID-CONTINENT first RADIO FOR WEST TEXAS & NEW MEXICO

KKG 526

STATION ON RADIO NETWORK

MIDLAND
ODESSA
SNYDER
KERMIT
BROWNFIELD
SUNDOWN
HOBBS
EUNICE

Projecting to a Height of 180 to 280 Feet from the Oil Rich Plains of West Texas and New Mexico, Mid-Continent Radio Towers Symbolize Our Advanced Service Facilities.



MID-CONTINENT Supply Company

General Offices Mid-Continent Bldg. FORT WORTH, TEXAS

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER

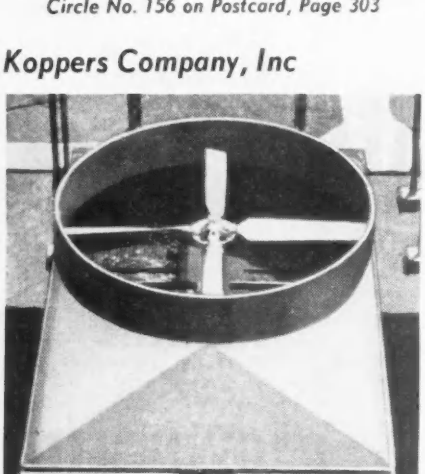
THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

K & G Oil Tool and Service Company

A Permanent Magnetic Type Fishing Tool is designed for "insurance runs" before diamond coring, and to remove hard-to-recover metallic junk. Various styles of rotary shoes are available to loosen junk and bring it within the tool's magnetic field, controlled and localized directly at the pole plate. Thus running inside cased wells does not diminish the tool's effectiveness. The magnet, composed of a new ultra-magnetic material developed by General Electric, picks up from 250 to 1200 pounds of metal, depending on size of the tool used. The tool attaches to drill pipe or tubing by means of threaded connections, and can also be run from wire line. It utilizes straight or reverse circulation for washing through bridges and circulating cuttings off fish.

Circle No. 156 on Postcard, Page 303

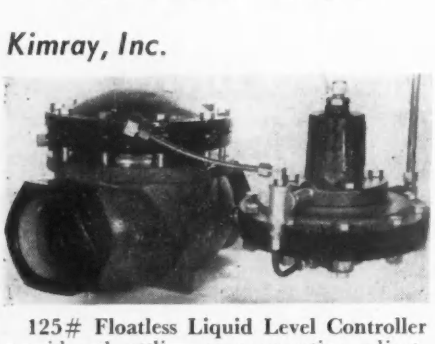
Koppers Company, Inc



Aeromaster Fans, a modification of high-speed, top efficiency aircraft propeller blades, are designed for low-horsepower-requirement industrial cooling jobs. Standard models range from 5 to 20-foot diameter, with 4, 6 or 8 blades per fan, and in capacities up to 500,000 cubic feet per minute. Blades are adjustable by one man, and the fan can be installed by unskilled labor.

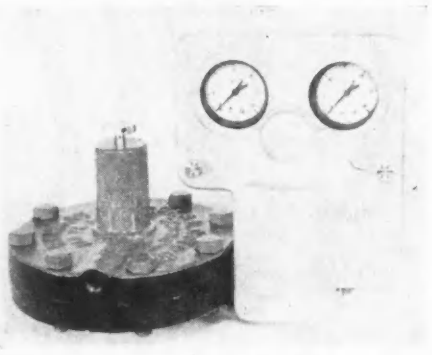
Circle No. 157 on Postcard, Page 303

Kimray, Inc.



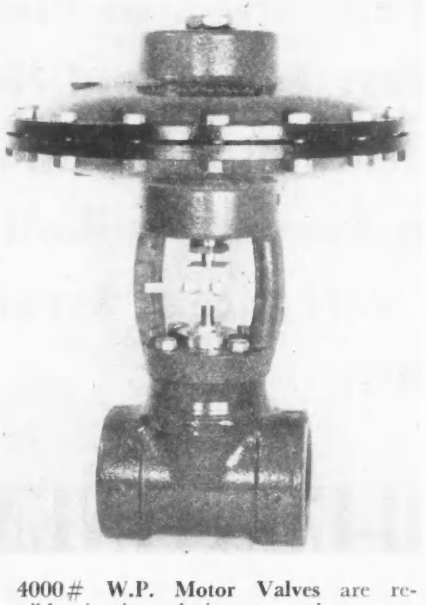
125# Floatless Liquid Level Controller provides throttling or snap-action adjustment in dumping oil or water from separators, treaters, gunbarrels or knockouts. It can be used to control liquid height on any application where gas or air pressure is available. Level adjusting screw permits varying range of fluid head. Non-bleed pilot operates motor valve with single full line size seat. Seating member is synthetic rubber operating against removable metal seating surface. Controllers are furnished with light spring for maintaining separator heads of approximately four feet or heavy springs for controlling high levels in gunbarrels.

Circle No. 158 on Postcard, Page 303



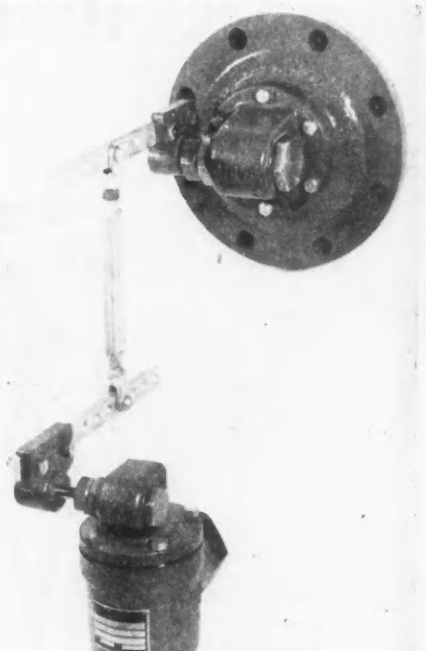
Type 400 PL Floatless Liquid Level Controllers, of the non-bleed type, are capable of controlling interface level as well as conventional fluid heads in high pressure vessels without the use of a float. Other than mounting connection, the 4000-pound working pressure model requires neither mechanical connection nor projection inside the vessel. Pilot controls by fluid communication through mounting piping under adverse conditions of sand and hydrate build-up. Pilot provides throttling or snap-action operation without removal or addition of parts. Level adjusting screw permits varying range of fluid head. The controllers are available also in 500-, 1000- to 2000-pound w.p., complete with drip pot and pilot supply regulator.

Circle No. 159 on Postcard, Page 303



4000# W.P. Motor Valves are reversible (spring closing to spring opening, or spring opening to spring closing) without removing from piping. Teflon stuffing box requires neither adjustment nor tightening to insure leakless low friction operation. The valves are also available in 1000- and 2000-pound working pressure models, angle or through type body, with plug and seat sizes ¼- to ½-inch in carbide; ¾- to 1-inch in stainless or high chrome.

Circle No. 160 on Postcard, Page 303



125# Mechanical Oil Valves with single synthetic seat, replaceable in the field, are direct-float operated. Valve is balanced for throttling control. They are available in 2-, 3- and 4-inch sizes with a new Teflon rotary type stuffing box seal which is leakless and essentially friction free. Float opening covers, with removable trunnion tips incorporating the Teflon stuffing box, are available in 6-, 8-, and 10-inch, 125-pound ASA sizes. The assembly furnished with inside float hub, outside lever hub, lever arm, and turnbuckle.

Circle No. 161 on Postcard, Page 303

The Lug-All Company

The new Lug-All 1½-ton alloy winch-hoist is designed with a 30 to 1 power ratio and fully tested to a 100 percent overload. Weight of the hoist is held to under ten pounds. Standard features include preformed flexible aircraft cable, stainless steel fittings and springs, and oiled-for-life bearings. The handle is reversible and acts as a safety valve to protect the user. If a rigging must be left overnight, the handle can be removed in ten seconds, leaving the setup tamperproof. A combination of three swivel hooks and a built-in pulley block allows work to be done around corners, and as close as ten inches at the ¾ ton rating. Locking is positive and automatic. There is no brake to slip. The hoist can be operated in any position, and may be set for forward, reverse or free wheeling. Ten feet of cable winds out of the way onto the drum.

Circle No. 162 on Postcard, Page 303

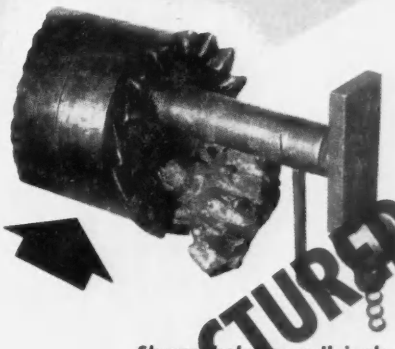
K & G

MAGNETIC FISHING TOOLS

INSURE COSTLY DIAMOND CORE HEADS

REMOVE HARD-TO-RECOVER CONES

The tool at right demonstrates the ultra-magnetic power of K & G magnet by holding a large rock bit in its powerful field.



Shown below small junk removed with K & G Magnetic Fishing Tool.

DESIGNED, DEVELOPED and MANUFACTURED in the USA

Don't let junk in the hole tear up expensive bits and core heads. You can remove metallic junk quickly and easily with the powerful new K & G Magnetic Fishing Tool.

This tool uses a powerful magnet to pick up all sizes and shapes of junk. Chipped teeth, lost cones, bearings, sledge hammers, and even bits, can be removed with the K & G Magnetic Fishing Tool.

The magnetic field is controlled and focused at the pole plate, with no magnetism emanating from any other part of the tool. Hence, operating inside of cased wells does not diminish the tool's effectiveness.

The tool is ruggedly designed to withstand any and all normal operations. Various styles of rotary shoes are available, designed to assure maximum recovery on clearance runs, cone runs, or fishing for deep, hard-to-recover metallic junk. Both straight and reverse circulation tools are available, both equally effective for washing through bridges and circulating cuttings off fish, so that direct contact can be made.

This tool can be run on tubing, drill pipe, and in cases where hole is clean and free from cuttings, can be run from wire line.

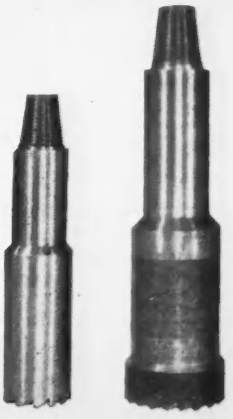
PROVED BY MANY FIELDS

The result of seven years' field experience and research, the K & G Magnetic Fishing Tool has been proved by hundreds of runs to be the most practical fishing tool yet developed for removing small junk. Major oil companies and drilling contractors throughout the Southwest have found the K & G Magnetic Fishing Tool efficient and dependable.

AVAILABLE NOW

The K & G Magnetic Fishing Tools are available in sizes 3¼", 4", 5", 6", 7", 8", 9" and 11½", on a rental basis.

Phone, write or wire *now* for quotations on use in your area.



K & G

OIL TOOL AND SERVICE COMPANY, Inc.

2703 Sackett Street — Houston 6, Texas — JAckson 5436

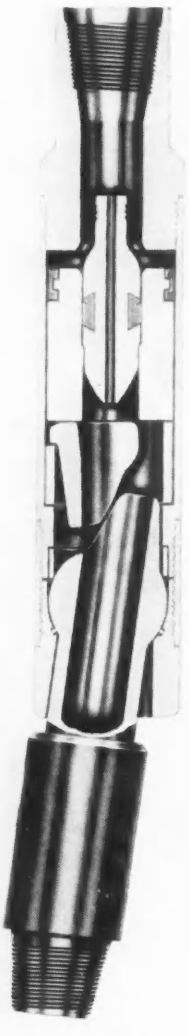
BRANCH OFFICES: ODDESSA • HOBBS, N. M. • DUNCAN, OKLA.

LeBus Rotary Tool Works, Inc.

The LeBus Type "JBL" Internal Cutter may be run on drill pipe, tubing or sucker rods, determined by size and conditions. The "JBL" Cutter is simple in operation and it is claimed that hundreds of cuts may be made without any maintenance other than sharpening the Mill Type Cutter Knives. This cutter will not dig in or hang because of the "Double-Edge" cutting features of the knives; therefore, professional operators are not required.

Circle No. 163 on Postcard, Page 303.

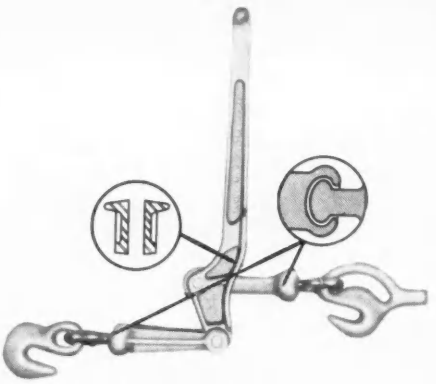
JBL Pipe Cutter



FO-47 Knuckle Joint

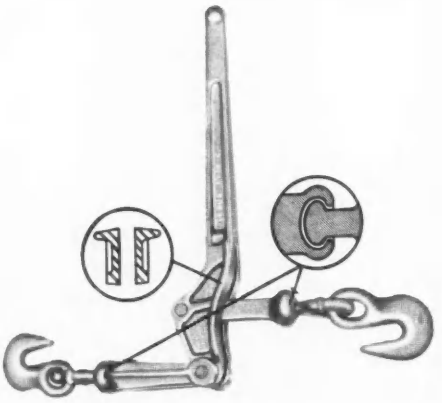
The LeBus FO-47 Knuckle Joint assists fishing operations because its angling greatly increases the area in which fishing tool can grasp fish. Full opening bore permits use of inside cutters, logging instruments on other tools while Knuckle Joint is still in hole. Ball and socket construction is of sufficient strength to permit the most severe jarring, pulling or rotating. The LeBus Knuckle Joint-Overshot Fishing system consists of running the knuckle joint above the overshot on every fishing job in order to contact and remove the fish as quickly as possible. Any make of overshot, pipe spear, tap or fishing tool can be used in connection with the LeBus FO-47 Knuckle Joint.

Circle No. 164 on Postcard, Page 303



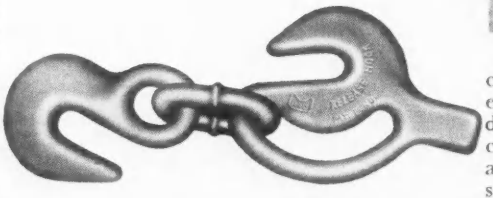
LeBus Releasing Load Binder with Double Releasing Hook and Single Releasing Hook holds the chain firmly locked regardless of a shifting load. This eliminates the likelihood of a heavy load shifting and jamming the chains to the extent that it is necessary to cut the chain or dismantle the load binder. The tools are drop forged for carbon and alloy steels and are heat-treated after forging for strength. Each tool is given the Full Pull Strength Test before it leaves the LeBus plant.

Circle No. 165 on Postcard, Page 303



LeBus "Bulldog" Load Binders are drop-forged of carbon and alloy steels, and are fully heat-treated after forging for extra strength and durability. Ball-and-socket swivels are forged and formed so they cannot bind or pull apart; they always swivel freely. Clevises and hooks have the strength to withstand the roughest service without deforming. Before shipping each LeBus "Bulldog" Load Binder is tested on the LeBus "Pull Test" Machine for the full pull test strength and are fully guaranteed against failure in service for which they are designed.

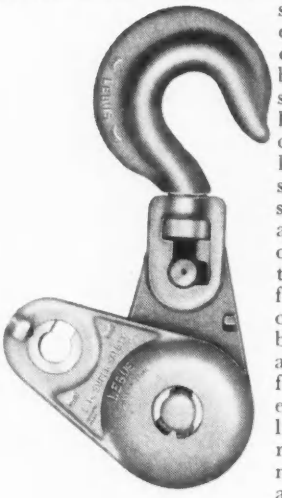
Circle No. 166 on Postcard, Page 303



The LeBus Double Releasing Hook Assembly is made by combining the LeBus Releasing Hook with a LeBus Industrial Chain Hook. Single Releasing Hooks are available for connecting the end of a chain with a LeBus Missing Link. Either the Double Releasing Hook or the Single Releasing Hook can be used on the same chain or can be used in connection with a regular Load Binder for the purpose of releasing a shifted load. Both of these hooks are drop-forged high quality carbon and alloy steels and are furnished in chain sizes from ¼ inches to ⅝ inches.

Circle No. 167 on Postcard, Page 303

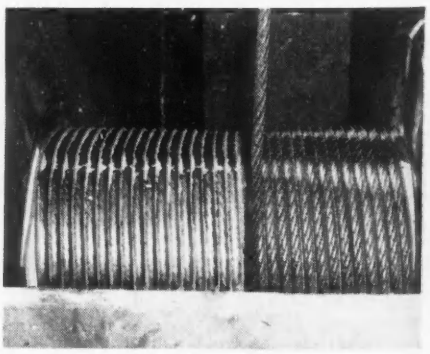
LeBus "All Purpose" Super Safety Snatch Blocks are built for speed and safety in operation. They can be assembled or disassembled in high or difficult places—line can be inserted in the sheave while atop gin pole or derrick. No tool is needed for assembly or disassembly. Sheaves are designed for use with either wire line or manila rope. There is no chance of accidental opening by jarring or vibrating; no losing of blocks or parts; and no threaded nuts or bolts to burr or foul. Bronze hub caps on sheave prevent hazardous sparking around gas and oil. All parts are made of steel drop-forged and heat treated for strength and durability.



Circle No. 168 on Postcard, Page 303

LeBus International Engineers, Inc.

The LeBus Grooving and Controlled Pyramid Spooling System eliminates the 100 percent helical angle on which wire line has been spooled in the past. This new system of wire line grooving and spooling uses a set of new style angle



control sections which are placed against each flange of the hoisting drum in a directly opposite position. Grooved angle control segments are installed all the way across the drum between the angle control sections and lie only on 10 to 25 percent of the circumference of the drum. This angle control section controls the wire line kickover and makes the wire line progress across the drum core within a limited area during the hoisting operation. Parallel Spooling is created on the balance of the drum or on approximately 75 to 85 percent of the circumference.

Circle No. 169 on Postcard, Page 303

THE WORLD LEADER

FOR STABILIZING OR REAMING — SECURITY REAMERS *LEAD THE FIELD*

A Security Reamer-Stabilizer in your drill string is your greatest assurance of a clean, straight, full-gauge hole.

Security's 22 years of successful laboratory research and development, combined with practical field engineering and experience, has gained for Security Reamers their leading position in reaming and stabilizing.

Whether it's reamers, rock bits, hole openers or casing scrapers — Security products are geared to the stepped-up requirements of today's intensified drilling efforts, and are being used by operators throughout the world.

Three barrel-shaped cutters contact over one-third wall circumference — acting simultaneously as cutters and as large roller bearings. Unexcelled for reaming, directional drilling, minimizing keyseating, stabilizing, etc. All sizes.

GET Security IN DRILLING

ONE OF THE DRESSER INDUSTRIES

SECURITY ENGINEERING CO., INC.

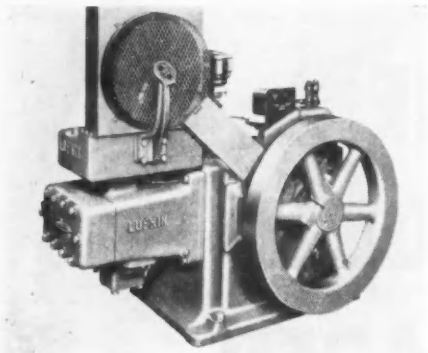
Main Office and Plant: Whittier, California
Branches in all major producing areas
Export Office: Chanin Building, New York City

ROCK BITS • REAMERS • HOLE OPENERS • CASING SCRAPERS • SECURALOY

512-3

Lufkin Foundry & Machine Company

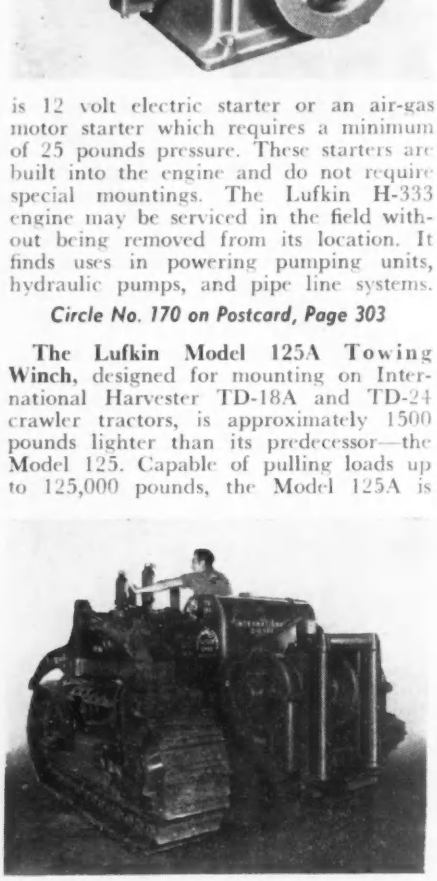
The Lufkin H-333 Gas Engine is a horizontal, two cylinders, two cycle, crosshead construction, heavy-duty, oil field engine. It has a 5½-inch bore and 7-inch stroke, and is rated for continuous duty 20 horsepower at 425 revolutions per minute and 30 hp at 650 rpm. The speed range is 350-750 rpm. The engine is furnished standard with condenser cooling, Twin Disc clutch, centrifugal governor, full pressure lubrication, oil bath air cleaner, Ensign "XG" natural gas mixer and regulator, and combination oil and water safety control. Optional equipment



is 12 volt electric starter or an air-gas motor starter which requires a minimum of 25 pounds pressure. These starters are built into the engine and do not require special mountings. The Lufkin H-333 engine may be serviced in the field without being removed from its location. It finds uses in powering pumping units, hydraulic pumps, and pipe line systems.

Circle No. 170 on Postcard, Page 303

The Lufkin Model 125A Towing Winch, designed for mounting on International Harvester TD-18A and TD-24 crawler tractors, is approximately 1500 pounds lighter than its predecessor—the Model 125. Capable of pulling loads up to 125,000 pounds, the Model 125A is



equipped with a two speeds forward and two speeds reverse transmission giving a wide range of operating line speeds. The cable drum is driven from the transmission through a worm drive. The one-piece, welded construction winch housing completely shields the transmission, thus protecting the transmission from damage from the drum cable. The cable guide rollers are an integral part of the winch. The Model 125A has two brakes. The drum brake is a band self-engaging type with a toggle linkage. The safety brake is located on the worm and is a safety measure to prevent loads from falling should the power train be broken.

Circle No. 171 on Postcard, Page 303

Lufkin TC-OLB-456S single reduction herringbone gear pumping unit assembly with 120-inch stroke has 468,000 pound-inches peak torque capacity, 10.71 gear ratio, 48-inch pitch diameter sheave with 15 "C" groves or 10 "D" grooves; and 7-inch diameter crank shaft. Structural rating is 30,000 pounds. Three other structural assemblies are available for 108-, 84- and 74-inch maximum strokes. The pumping unit can operate as slowly as 8¾ strokes per minute with 9-inch P.D. "C" groove sheave on 500 rpm engine, or 12.6 spm with 13-inch P.D. "D" groove engine sheave. Gear box fits interchangeably on four structural assemblies with 456 DA Double Reduction Gear Reducer.

Circle No. 172 on Postcard, Page 303

Link-Belt Company

Non-Clogging Spray Nozzles consist of a scientifically shaped, curved bronze deflector having a smoothly polished water contact surface and a sharp discharge edge. A U-bolt and two hexagon nuts hold the deflector in proper position on a pipe drilled with a plain hole at each desired spray location. For cleaning applications, the nozzles are available for pipes of one to three inches diameter, and capacity in gallons per minute through orifices of 5/32 to ½-inch diameter at pressures of 20 to 100 pounds per square inch.

Circle No. 173 on Postcard, Page 303

Model "NRM" Liquid Vibrating Screens are available in a wide range of sizes. The vibrator mechanism is self-aligning, roller bearing equipped, grease lubricated and fully protected from abrasive dust and corrosive moisture by labyrinth seals and steel housing. It can be dismounted by removing four bolts and without disturbing the installation.

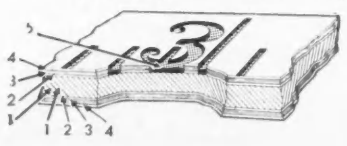
Circle No. 174 on Postcard, Page 303

Positive Action Oscillating Conveyors are used to convey, feed, cool and screen a variety of loose bulk materials. A continuous one-piece metal trough mounted on resilient supports is given an upward and forward oscillating motion by a constant-stroke eccentric drive, thus providing a powerful, yet gentle action that moves large volumes of material ahead in a uniform, continuous flow.

Circle No. 175 on Postcard, Page 303

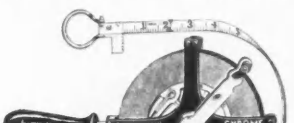
The Lufkin Rule Company

The Atlas Chrome Clad oil gauging tape, with attached bob and swivel snap, permits easy gauging since there is a good



non-glare contrast on the surface. This tape is extra strong since the line is 50 percent heavier than standard weight steel lines. The Lufkin chrome clad process gives a line that will not crack, chip or peel. It resists rust and is hard, smooth and easy to clean. The jet black markings on the satin chrome-white finish are usually free of glare and therefore easy to read.

Circle No. 176 on Postcard, Page 303

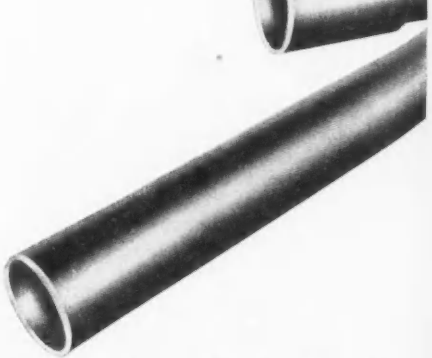


The Derrick Chrome Clad tape is designed for measuring casing standing in a derrick. The hook ring is detachable so that an engineer's ring can be attached and the tape used for general measuring. The chrome clad feature on this dual purpose tape results in a tape that can stand up under the heavy usage required for oil work.

Circle No. 177 on Postcard, Page 303

Linehan and Company

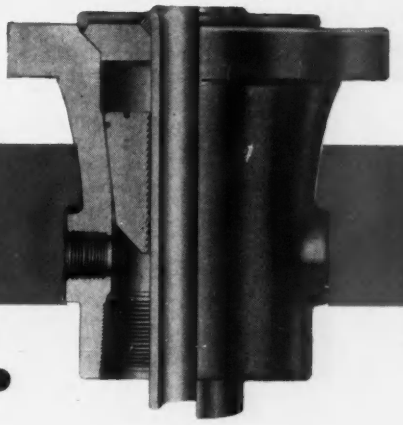
Linco Plastic Pipe, manufactured in 20-foot lengths of standard pipe sizes, is resistant to most ordinarily harmful chemicals, soil conditions and electrolytic action. It is also resistant to build-up of solid deposits such as paraffin, asphalt, or other



depositions that reduce flow in ordinary pipe. It is lightweight—100 feet of two-inch pipe weigh only 50 pounds—and its resistance to impact at ordinary temperatures is good. No special care is required in ditching and back-filling operations. The pipe is made up into sections through use of slip-sleeve couplings and brush-applied cement.

Circle No. 178 on Postcard, Page 303

ONLY RECTORHEAD CASING HEADS . .



. . give you these Vitally Important advantages

RING-OF-STEEL SEAL
A good weld plus API ring gasket make the Rectorhead seal the strongest, safest casing head seal available. It never requires repacking or maintenance.

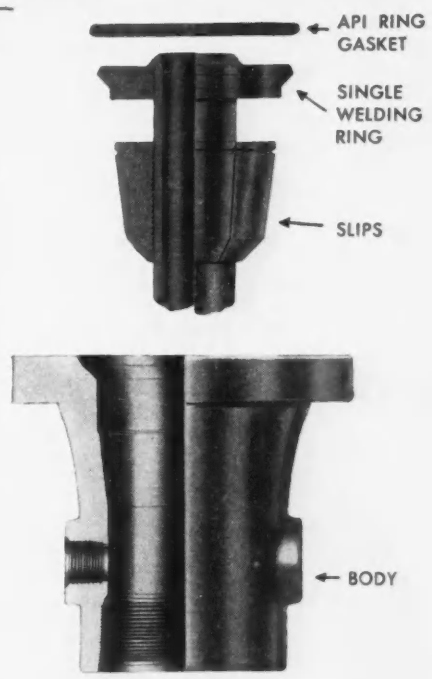
FIRE-PROOF, FREEZE-PROOF
Seal can't burn out in case of fire . . . won't contract due to freezing, even in coldest weather. Immune to corrosion inhibitors.

SIMPLE INSTALLATION
Just set slips, cut off pipe, weld ring to pipe and seal is completed by API ring gasket when blowout preventer, subsequent head or other equipment is bolted in place.

NO RESILIENT PACKING
Rectorheads have no complex packing and slip arrangement. You are not dependent on soft packings to hold the important seal between strings of pipe.

NO BULKY WELDING FLANGE
The welding ring fits into a ground seat in the Rector head body. Pipe is cut off practically flush with welding ring. Blowout preventer, or subsequent equipment is flanged directly on the head body.

PROTECTOR RING
When drilling operations are carried on through the head this ring, furnished with every casing head, protects the slip and welding ring seating surfaces in the body from being damaged by drilling tools.



• Notice how slips, welding ring and API ring gasket are easily installed in the RECTORHEAD Casing Head. All blowout preventers, valves, flanges, spools and tubing heads of API specifications will bolt directly to all RECTORHEADS.

RECTOR WELL EQUIPMENT COMPANY INC

★ MAKING THE OIL INDUSTRY SAFER ★

1100 NORTH COMMERCE ST FORT WORTH, TEXAS

Houston Plant: 2215 Commerce St.

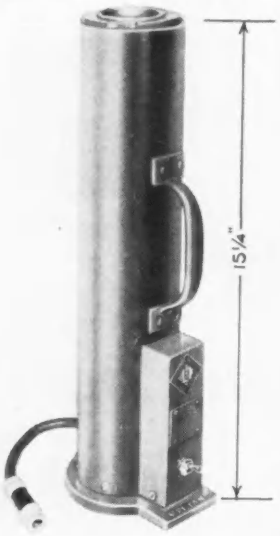
REPRESENTATIVES IN ALL ACTIVE FIELDS

RECTORHEAD RECTOR FULBORE CEMENTING METHOD RECTORSEAL

ASSOCIATION OF WELL HEAD EQUIPMENT MANUFACTURERS CERTIFIED

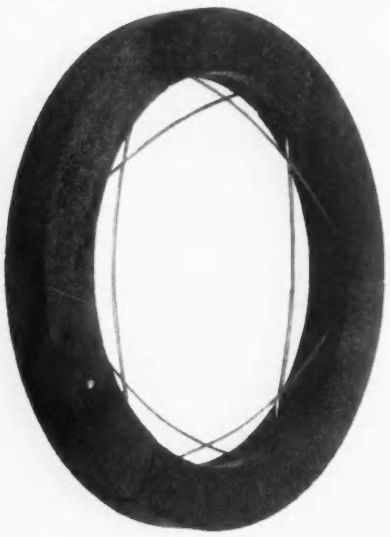
L-K Pump Valve Company

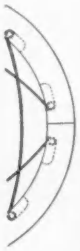
The Melton Heating Hydrometer Cylinder heats samples of waxy crudes so that hydrometers will float in these samples, thus assuring correct readings. The heat is thermostatically controlled and the thermostat can be set to the desired temperature according to conditions encountered. It is housed in strong, lightweight steel with full sized insulated aluminum cylinder and bronze base. The inside dimensions conform to API specifications. This heating hydrometer cyclinder is furnished in two models—one for use with 6-volt DC current, while the other is for 110-volt AC. The hydrometer cord is easily plugged in and out by means of a special connection.



Circle No. 179 on Postcard, Page 303

The Single and Double Segment Rings and Expanders are a new method of expanding segmental rings for use on pump and compressor pistons. The advantages claimed include uniform pressure to each segment, little fatigue to the expanders and uniform wear on the segment. It permits the dowelling together of two thin segments to make long, strong joints, or heavier expanders can be used with full width segments and conventional joints. Practical for use with metal segments, there is less danger of expanders fouling ring or cylinder. Rings can be furnished or laminated phenolic, bronze, iron or other materials. A special method for fitting stainless steel spring wire into the sockets or grooves in the segments makes possible uniform pressure to each segment. This uniform pressure distributes the wear on the outer circumference of the ring equally.





Circle No. 180 on Postcard, Page 303

The Melton Electric Heating Centrifuge not only heats the oil samples in a preheating tube compartment, but also in the thimbles attached to the rotating head of the centrifuge proper. This centrifuge is thermostatically controlled, assuring true tests regardless of atmospheric temperatures, viscosity or chemical content of oil. These heating centrifuges can be furnished with either two or four-way rotating heads for the 12.5 ml or 15cc tubes, and two-way only, for 100 ml or 200cc pear-shaped tubes. This instrument is furnished in 6-volt only at present, although the 110-volt AC machine is expected to be available within a few months.

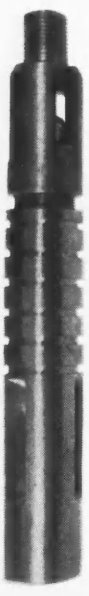
Circle No. 181 on Postcard, Page 303

Leco Manufacturing Company

The Leco Wire Line Safety Socket is for wire line when either swabbing or fishing. Made of Stressproof Steel with a special shear pin, the socket will save expensive wire line breakage and lost time for fishing broken and coiled lines. The pin is designed to shear before the line breaks, and as the pin shears the top part of the socket is pulled from with line, leaving a convenient fishing neck on swab as shown at right. The socket is furnished with API pin and box thread connections.

Circle No. 182 on Postcard, Page 303

Leco Lift is a new lifting device for all pumping wells. It is claimed to prolong life of bottom hole pump by distributing the fluid column load in the tubing string. The instrument also reduces rod breakage and saves surface maintenance by a lighter and smoother polished rod load, according to the manufacturer. One Leco Lift is used every thousand feet or less, depending on depth and well condition. The device can be furnished with metal cup, or plastic section for 2- and 2½-inch tubing.



Circle No. 183 on Postcard, Page 303

Mission Manufacturing Company

The Mission *E-Z* Swab offers a safety factor because it automatically bypasses fluid overloads which may cause line breakage. The swab goes smoothly through tight spots and paraffin bridges, practically eliminating the danger of sticking which results in slack line danger. Each swab rubber lifts approximately 400 feet of fluid, so operator may control amount of list by selecting number of swab rubbers he will run. The *E-Z* Swab Rubbers touch the tubing with only slight contact pressure, and there is little danger of a broken wire line. Lightly touching rubbers also reduce damage to expensive plastic coated and plated tubing. Built-in swivel action makes line swivel unnecessary, and the flexible action of the swab rubber in paraffin and tight spots reduces need for jars.

Circle No. 184 on Postcard, Page 303

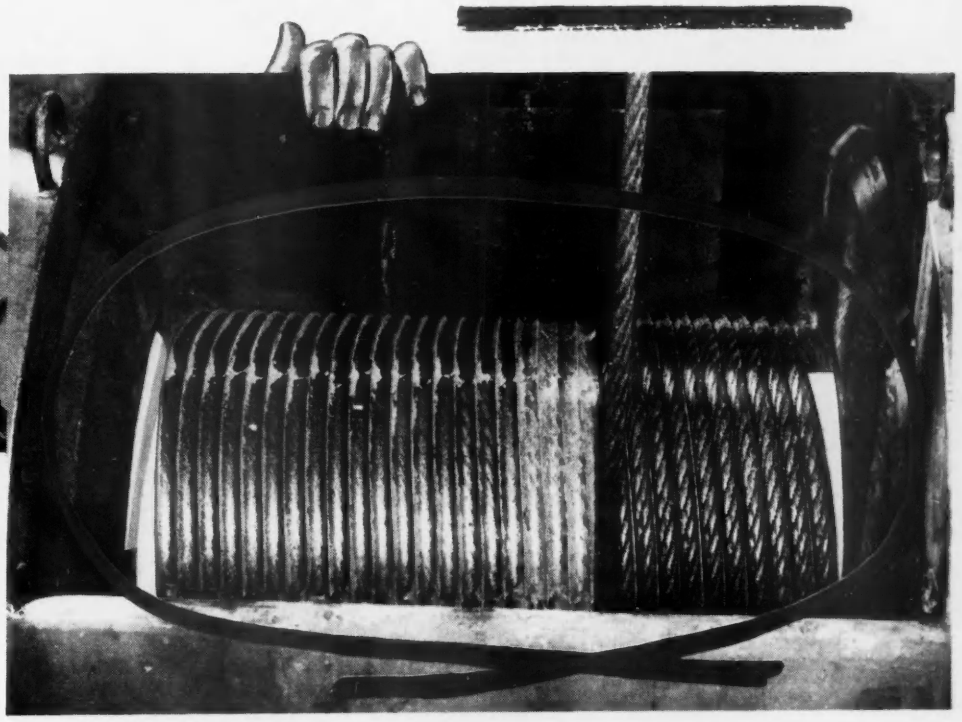
McGill Manufacturing Company

The 5000-G Series Grounded Portable Light has a three-wire convenience outlet for attaching power tools. The lamp guard series has two cage designs—one with a concentrating end lens and rotary reflector for focusing light, and the other with standard McGill No-Rol cage and reflector constructed of heavy wire. The guards have molded phenolic handles which are nonconductive, heat and impact resisting and positively insulated. The complete assembly resists oils, greases, some acids, flame, moisture and abrasion.

Circle No. 185 on Postcard, Page 303

yes Sir...

there's a reason why...



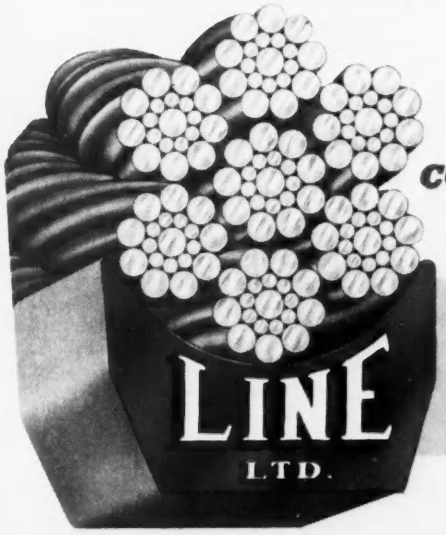
M. J. Delaney Drilling Co. uses...

LeBus Grooving & *Controlled Pyramid* Spooling System

★ ***SAVES...***

DRILLING TIME
WIRE LINE
CREW ACCIDENTS

Harry T. Jewel, Drilling Superintendent says, "We are more than well satisfied with LeBus Grooving and Pyramid Spooling System. ... Its cost was well justified as it will pay for itself many times in the amount of drilling time and wire line saved." E. C. Smith, Toolpusher, states, "before we grooved this rig it took us 4½ hours to go into the hole (12,000 ft. depth)... after installing LeBus Grooving, we went into the hole in less than 2 hours..." Statements such as these show why LeBus Grooving is an important development. Contractors who wish to conserve in these times of critical steel shortages and rising labor costs are installing the LeBus Grooving and Controlled Pyramid Wire Line Spooling System. You'll profit by calling a LeBus Representative... let him give you full information.



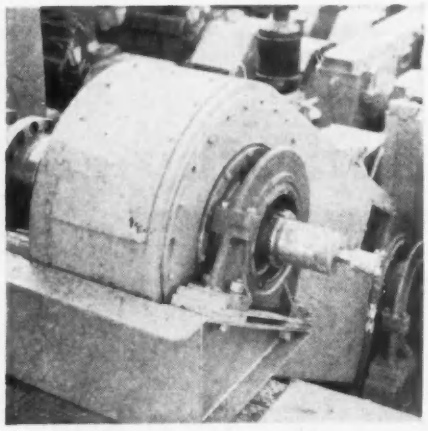
COMPLETE SALES and SERVICE EVERYWHERE

COMPLETE LITERATURE UPON REQUEST

LEBUS INTERNATIONAL ENGINEERS LIMITED

SALES, SERVICE Control and Warehouse Stock: LONGVIEW, TEXAS
Executive Offices: 300 Wichita National Bank Bldg., WICHITA FALLS, TEXAS

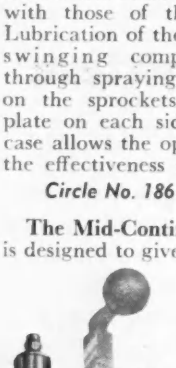
Mid-Continent Supply Company



The Swinging Final Drive is a drawworks input drive that pivots at number one engine skid and is transported as a complete assembly without disconnecting the chain. The flexible coupling at the drawworks input shaft is merely disconnected and the swinging final drive swung back into a vertical position and pinned there. A bracket is attached to the drawworks to support one end of the swinging final drive and to provide alignment with the input shaft. There is no sidepull on the drawworks input shaft and no brace required to prevent slack chain. The swinging final drive, when lowered into operating position, furnishes accurate spacing between drawworks and compound. The swinging final drive and Mid-Continent compound chains are enclosed in oil-tight, dustproof cases, and are supplied either with or without Fawick master clutch and neutral brake and with either 1½-inch pitch quadruple or 1½-inch sextuple chain. The bearings as well as the bearing houses and other parts are interchangeable with those of the swinging compounds. Lubrication of the swinging final drive and swinging compounds is accomplished through spraying a stream of oil directly on the sprockets. A Plexiglas inspection plate on each side of the swinging drive case allows the operator to see at all times the effectiveness of the spray lubrication.

Circle No. 186 on Postcard, Page 303

The Mid-Continent Low Pressure Alarm is designed to give shrill and positive warning when the lubricating oil pressure fails for any reason. It is set for 20 pounds of pressure or below, but can be adjusted. It is simple to install and the operation is automatic. Both the volume of the whistle and the operating pressure can be regulated easily. It is delivered set to operate on air pressures up to 120 pounds without pressure reduction.

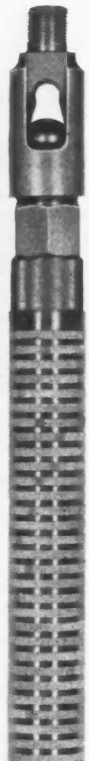


The alarm is built of cast bronze and stainless steel and the only parts subject to any appreciable wear are the synthetic rubber O-rings on the piston. The warning whistle can be located where desired—either at the engine, or at positions where the alarm can be more easily heard by use of Stratoflex Flexible Hose and Connections. The Low Pressure Alarm fits any type of engine.

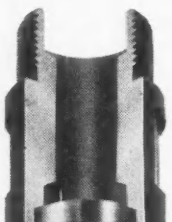
Circle No. 187 on Postcard, Page 303

John N. Martin, Manufacturer

The Longer Martin Plungers with loose ring fit in the barrel are constructed on the principle of simplicity and durability; they consist of a grooved undersize body, and split rubber and duck rings mounted in the grooves. With more rings, slippage is held down with looser ring-fit, which results in less wear on both rings and barrels, lighter rod loads, and better travel in the barrel. Depth of well determines the length of plunger required and the gravity of the oil determines the proper size of ring to give the right working fit in the well. The plunger is made in diameters from 1 to 4¾ inches, with either API or non-API threading. Rings of any size desired are available.



Circle No. 188 on Postcard



Martin Cages now have resilient synthetic rubber ball guides. The rubber does not beat out and withstands abrasion better than metal, according to the manufacturer. The cages are made in open and closed types, for either rib seats, flat seats or Pacific seats. All sizes and styles are available from 1 to 4¾ inches.

Circle No. 189 on Postcard

The Marley Company, Inc.

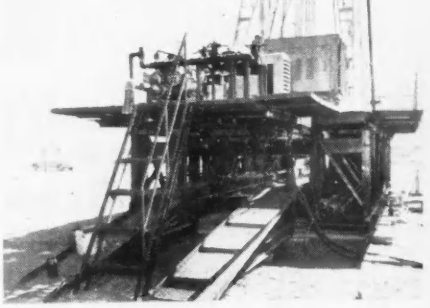
The Marley Double-Flow Aquatower is a water cooling tower for use wherever intermediate capacities of cold water are required. The tower is only 7½ feet tall for the 150-ton unit. Low pumping head and fan horsepower are required for any given capacity and design performance. With the Double-Flow principle, one fan utilizes air from two completely open sides. All parts, including piping, nail-less redwood filling, basin fixtures, fan and motor and distribution basin, are readily accessible. Seven standard sizes, starting with a 50-ton unit, are available in all steel or wood with asbestos cement board casing.

Circle No. 190 on Postcard, Page 303

Lee C. Moore Corporation

A 131-foot Mast has a new type bottom section with double front legs for extra stability and increased visibility so the driller can see the complete block travel from his position. The mast has a capacity of 510,000 pounds, base width of 18 feet, 5½ inches, and clear working height of 131 feet. The 131-foot model can be converted to a 100-foot mast with a 15-foot wide base. Mast and substructure have ramp in front of substructure, gin pole erection device, windows for Athey beams in substructure and gates in side to clear wellhead equipment.

Circle No. 191 on Postcard, Page 303



A New Substructure Arrangement can be adapted to accept any trailer-mounted rig and provides flush floor for safe drilling operations. Design provides for complete support of trailer unit, making the trailer an integral part of the substructure for drilling operations. No load is carried by the tires during drilling operations. The substructure is especially adaptable for shallow drilling or workover where frequent moves are required.

Circle No. 192 on Postcard, Page 303

Macwhyte Company

Safe-Lock Wire Rope Assemblies are made in a variety of styles to be used for operating controls, as a part of machinery and equipment, or for slings and hoists. The assemblies consist of a length of PREformed wire rope with a terminal attached to one or both ends. The wire rope may be bright or galvanized carbon steel, stainless steel, or monel metal. Safe-Lock terminals are permanently swaged to any of these wire ropes and will develop holding strength comparable to the wire rope itself. The terminals are attached to the cable by a cold working process which causes the metal to flow into the valleys of the cable.

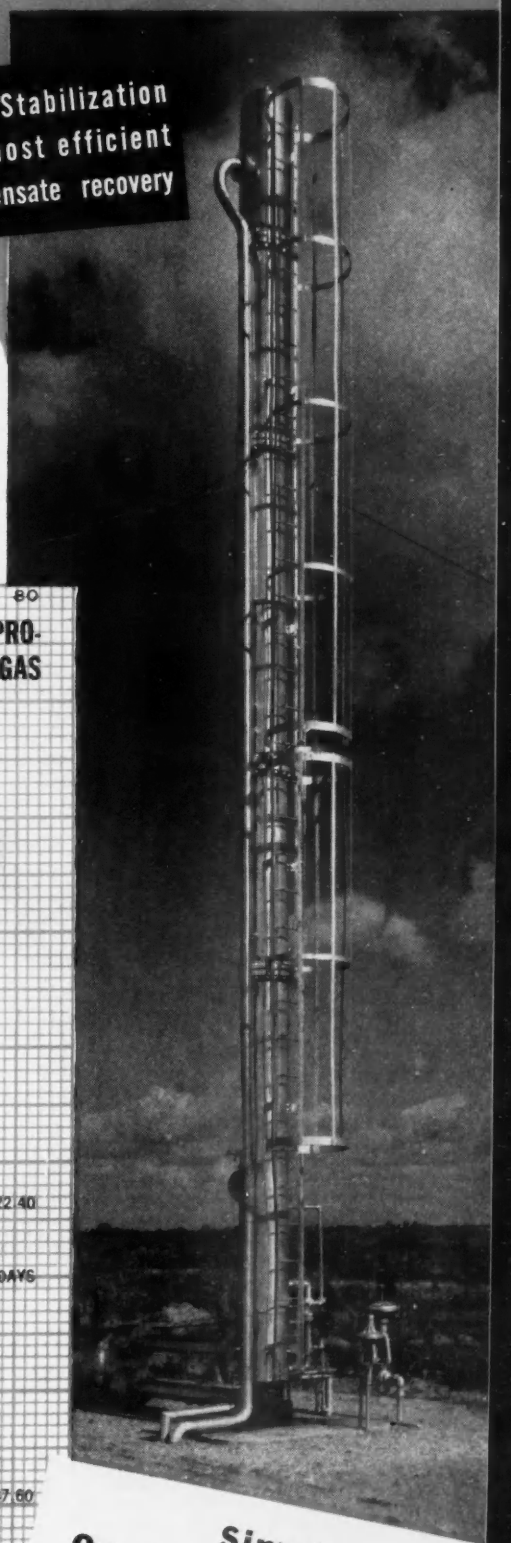
Circle No. 193 on Postcard, Page 303

BS&B STABILIZER

PATENT PENDING

So profitable it can pay out in a few months (or weeks)

So simple it can be operated with minimum supervision



Stabilization is worth considering for any lease with a low temperature separation system producing more than 50 barrels per day. Increase in the use of high recovery methods . . . low temperature separators, and the glycol injection system . . . has created demand for a process that will remove the normally gaseous components for maximum recovery of liquid in the stock tank. The BS&B high-efficiency Stabilizer is the answer to this demand — Available in four standard sizes (12′ x 34′ . . . 16′ x 35′ . . . 20′ x 44′ . . . 24′ x 45′) for profitable stabilizing of oil or condensate on the lease.

The BS&B High-Efficiency Stabilizer is a vital added step in getting the most revenue out of your oil. It is well known that considerable "shrinkage" occurs in flashing oil or condensate from high-pressure separator to stock tanks.

This shrinkage is due to the vaporization of some of the lighter hydrocarbons which are found in the liquid at high pressures, but vaporize quickly upon a reduction of pressure. Additional lower stages of separation reduce this shrinkage, but this reduction is limited, and normally only one or two additional stages of separation can be justified economically. As the temperature of separation is decreased the amount and percentage of the light volatile hydrocarbons in the liquid is increased. Thus, in low-temperature separation of a condensate well, although stock tank recovery is increased, the actual "shrinkage" from the separator to the stock tank is also increased. By dumping the condensate directly from the high-pressure separator to a BS&B Stabilizer, this shrinkage is reduced to a minimum — all the hydrocarbons which can be maintained at atmospheric temperature and pressure are recovered in the stock tank. Therefore, hundreds of your dollars do not literally "vanish into thin air."

The BS&B Stabilizer prevents this loss in simple fashion. The Stabilizer or distillation column is a tall pressure vessel containing bubble trays. Heat is supplied to the liquid in the bottom of the vessel causing vapors to rise through the column. These vapors are intimately contacted on each bubble tray with cooler descending liquid, the heavier fractions being condensed and the lighter fractions continuing upward. This continuous process of vaporization and condensation allows selective removal of only the lighter hydrocarbons from the liquid. Normally, all methane and ethane and propane are removed overhead and only as much of butane as can be retained in solution with the heavier hydrocarbons at atmospheric temperature and pressure remain in the condensate. All the pentanes and heavier hydrocarbons are recovered. Thus, condensate discharged from the stabilizer to stock (after being cooled to atmospheric temperature) is "dead."

Without producing additional reservoir fluid, the BS&B Stabilizer increases stock tank recovery.

BBLS/DAY CONDENSATE BASED ON PRODUCTION OF 2½ MMSCFD OF SALES GAS

(Actual Test Data)

0 10 20 30 40 50 60 70 80

3-STAGE SEPARATION

3-STAGE LOW TEMP. SEPARATION

LTS w STABILIZATION

DAILY INCOME 3-STAGE SEPARATION
2.5 MMSCFD GAS @ 8c/1000 . . . = $ 200.00
58 BBLS/DAY CONDENSATE @ $2.80/BBL = $ 162.40
TOTAL DAILY REVENUE = $ 362.40

DAILY INCOME-LTS
2.5 MMSCFD GAS @ 8c/1000 . . = $ 200.00
66 BBLS/DAY CONDENSATE @ $2.80/BBL = $ 184.80
TOTAL DAILY REVENUE . . = $ 384.80
ADDED DAILY REVENUE FROM LTS OVER 3-STAGE SEPARATION . . . = $ 384.80 − $362.40 = $22.40
APPROX. ADDED INITIAL COST OVER 3-STAGE SEPARATION . . . = $ 5,000.00
GROSS PAY-OUT TIME = $ 5,000.00 / $ 22.40 = 224 DAYS

DAILY INCOME-LTS WITH STABILIZATION
2.5 MMSCFD GAS @ 8c/1000 . . = $ 200.00
75 BBLS/DAY CONDENSATE @ $2.80/BBL = $ 210.00
TOTAL DAILY REVENUE . . = $ 410.00
ADDED DAILY REVENUE OVER 3-STAGE SEPARATION . . . = $ 410.10 − $362.40 = $47.60
APPROX. ADDED INITIAL COST OVER 3-STAGE SEPARATION . . . = $11,000.00
GROSS PAY-OUT TIME = $11,000.00 / $ 47.60 = 232 DAYS

Simple Operating Advantages of BS&B STABILIZER

1. All units designed with simplicity of controls to permit easy operation and trouble-free performance.
2. Completely automatic.
3. Safe indirect-fired salt bath reboiler.

EFFICIENCY BS&B RELIABILITY

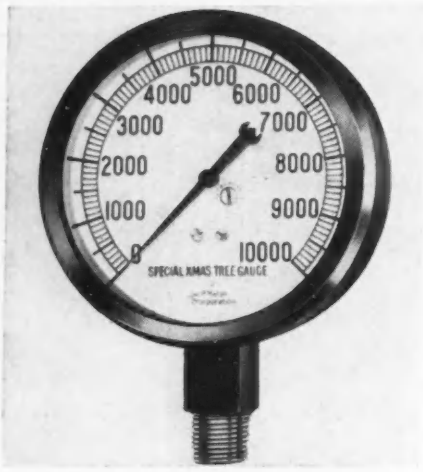
Get complete information now! Write for descriptive bulletin or call your nearest BS&B Service Branch. If you're in the oil country there's one near you.

BLACK, SIVALLS & BRYSON, INC.

OIL AND GAS EQUIPMENT DIVISION, DEPT. 1-55

MAIN OFFICE: WOODSIDE PLANT . . . OKLAHOMA CITY, OKLA.

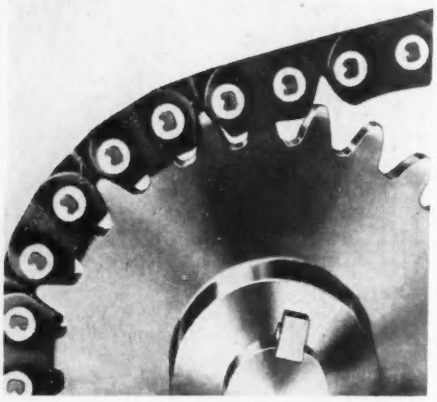
Jas. P. Marsh Corporation and Marsh Instrument Company



The Special Christmas Tree Gauge is a pressure gauge with several construction innovations. A new method is used to join the bourdon tube to the socket of the tube, and the end-piece to the bourdon tube. The bourdon tube is Conowelded into the socket and to the end-piece to form the equivalent of one-piece construction, the manufacturer says, and this assures a permanent, leak-tight seal. A heavy-gauge, wrought steel, copper-clad case is used, and is claimed to be non-corrosive. The movement of the gauge is the Marsh "Mastergauge."

Circle No. 194 on Postcard, Page 303

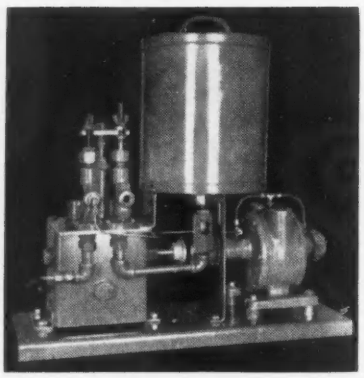
Morse Chain Company



Morse Hy-Vo (High Velocity) Chain Drive is a power transmitting medium designed for speed applications higher than conventional chain drives, and to replace unwieldy belt drives formerly required for high-speed power transmission. It is claimed that a six-inch Hy-Vo Drive will do the work of a 24-inch belt. A new chain-and-sprocket engagement principle virtually eliminates "chordal" or polygon action common to the usual chain drive. Sprockets resemble involute gears, having curved involute teeth which engage the Hy-Vo links with conjugate action. Compensating rocking joint eliminates slippage and wear. During chain articulation, the joint shifts the pitch-line automatically, engaging the involute sprocket teeth in such a way that the chain follows a path tangent to the sprocket pitch line. Pitch elongation or "stretch" is eliminated to the extent that it is virtually unnecessary to provide any means of takeup.

Circle No. 195 on Postcard, Page 303

Manzel Brothers Company



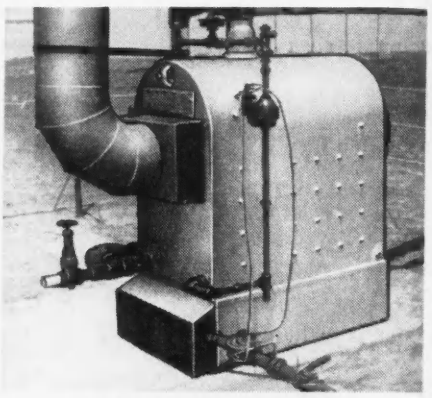
Manzel Gas Motor Driven Chemical Feeders are now available with automatic built-in force feed lubrication system. The feeders are constantly protected against corrosion within the motor, and thus may be used in wet gas fields where corrosion frequently causes stoppage and results in bad tanks of oil. If gas flow is intermittent, the motor will start itself as soon as the flow is resumed after stoppage.

Circle No. 196 on Postcard, Page 303

High Pressure Tubular Sight Feeds are available on Models 82 or 94 Manzel Lubricators (Model 94 operates against pressures up to 3000 pounds, and Model 82 up to 4000 pounds). The tubular sight feeds offer a clear view of the oil feed, require less attention than the bull's-eye sights ordinarily used in high pressure service, and keep the sight feed mixture transparent for a long period of time, according to the manufacturer.

Circle No. 197 on Postcard, Page 303

The National Radiator Company



STEAM GENERATOR

HEATING ELEMENT

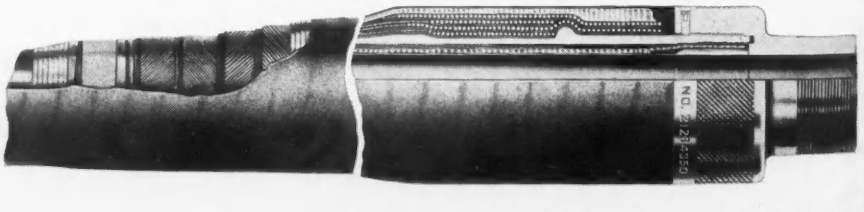
The Indirect Emulsion Heater for treating oil field emulsions consists of a standard National Steel Boiler, oil or gas fired, for generating low pressure steam, and standard cast iron National Sections form the heating element which is suspended in the sour crude. Because of the indirect firing method excessive hot spots are avoided and liberated suspended solids cannot settle to the bottom of the heater and reduce its capacity. Other claimed features of the unit include safe operations as the steam generator can be several hundred feet from the oil, corrosion resistance due to the closely grained gray cast iron construction of National Sections, and uniform heat distribution.

Circle No. 198 on Postcard, Page 303

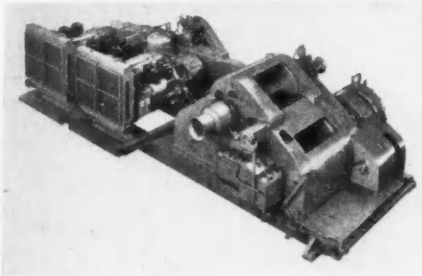
New York Belting & Packing Company

New Rotary Drilling Hose is designed to meet all drilling conditions. Built to handle the most severe pressure conditions with ample safety factor, it has higher burst value than former types, yet with great flexibility. It is intended for drilling from start to finish without switching to steel hose when drilling in under high pressure on deep hole rigs. The hose is made of four plies of single strand wire and marketed under brand name "Green Triangle 3-Band." It can be used on all types of rigs, including standard API, mast type and water rigs. It is suited for wildcat operations where hose life is of prime importance and shutdowns are extra costly. The pressure-resisting wires are applied by a specially designed machine at a scientifically determined angle to insure that in actual service every wire performs the same amount of work. Even with extra reinforcement, this hose is flexible and has high resistance to kinking.

Circle No. 199 on Postcard, Page 303

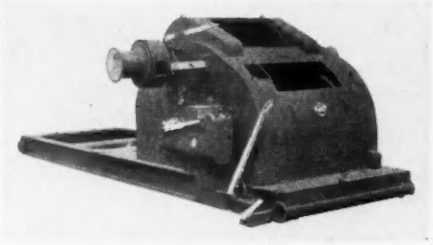


The National Supply Company



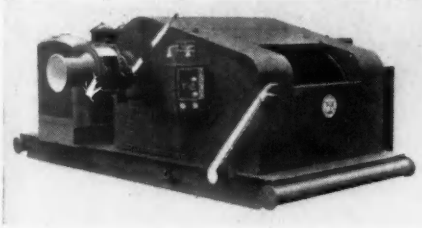
The Ideal Type 50-A Consolidated Rig is a redesign and modernization of the Type 50 for drilling to a depth of 5000 feet. This capacity is a conservative rating based on the use of 4½-inch drill pipe with 450 horsepower input. It is a "one-package" rig incorporating a "narrow type" chain compound drive group, thus facilitating transportation of the rig intact. The drawworks may also be used with a sectionalized Type "BL" drive group, which permits separation into unitized sections that are easier to handle in moving. This also enables the addition of a third engine for increasing slush pump capacity. The 50-A drawworks is separately available for use with equipment of comparable capacity.

Circle No. 200 on Postcard, Page 303



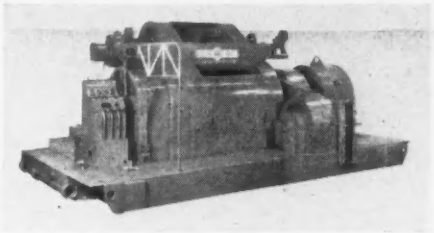
A new Ideal Type T-32 Consolidated drilling rig supplants the older T-25 rig. This new design employs a larger torque converter, permits the use of greater horsepower and is normally considered for drilling in the 3000 to 5500 feet depth range. The redesigned rig includes a Model 11,-500 series Twin Disc torque converter and changes in ratios in the drawworks transmission. With increased available power the T-32 has ample reserve hoisting capacity for use in emergencies such as pulling on stuck pipe. The rig retains the air-operated clutches on the main drum and rotary drives, and the Fawick Airflex inertia brake. The brake is used to stop rotating parts when making speed changes. A plain drum of the free spooling type has a barrel length of 39 inches and diameter of 15-13/16 inches.

Circle No. 201 on Postcard, Page 303



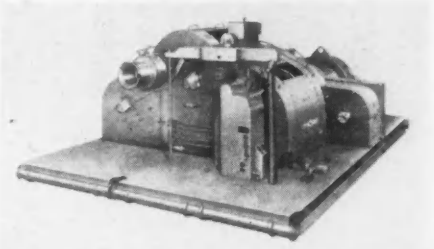
The Ideal Type T-12 drilling rig, designed for 120 input horsepower, will normally be considered for drilling in the 1500 to 3000 feet depth range and for servicing and workover jobs in the 3000 to 6000 feet range. The T-12 rig is readily adaptable to trailer or truck mounting. Air controls are provided for Fawick Airflex clutches on the main drum, sand reel drum and rotary drive, and for the engine throttle, inertia brake and breakout cathead. The hoisting drum, 12¾ inches in diameter and 36 inches long, is a free spooling type mounted on roller bearings. It has a new wire line clamp which locks the end of the line into a socket on the side of the drum flange, thus making removal of guards unnecessary. National's compound equalizing brakes are used on the drum. Over-all height of the skid-mounted rig is 51¼ inches. Width without catheads is within eight feet. Skid is 14 feet long.

Circle No. 202 on Postcard, Page 303



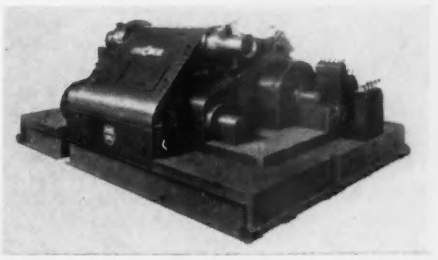
The Ideal Type 80 Consolidated Drilling Rig is designed for a maximum of 800 input horsepower to the drawworks and is normally considered for drilling in the depth range of 6500 to 10,000 feet. The rig is designed to utilize the inherent flexibility of the torque converter for drilling services. The Type 80 is essentially a one-piece drawworks with a narrow demountable front section on which only the rotary drive countershaft and its air clutch are mounted. The entire drawworks may be transported as a unit or the front section may be removed to meet highway width limitations without disturbing major drawworks components. The entire front section can be eliminated when a direct rotary drive is used. Sectional drive groups are available for either high speed or low speed engines. All have Airflex engine clutches as well as Airflex compounding clutches.

Circle No. 203 on Postcard, Page 303

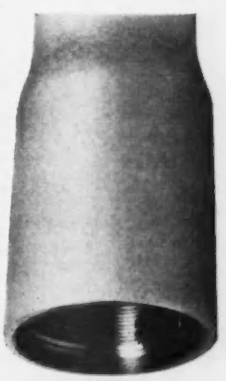


The Ideal Type 75-CA Consolidated Rig, a new drilling rig for medium depths, is designed for 650 input horsepower and is normally considered for drilling in the 6500 to 9500-foot depth range. The new rig supersedes the Ideal Type 75 Rig. New features include (1) Ideal Dy-A-Flex air clutch for the high drum drive, (2) air-operated Twin Disc Model "P" air clutch for rotary drive, (3) separate, centralized control cabinet for air operation of the rig, (4) 1½ inch pitch quadruple engine-to-drawworks drive chain, (5) notched drawworks base for step down location of drive group, and (6) full enclosure and oil bath lubricatoin of all chain drives. The rig may include one of several optional Type "B" Drive Groups. Although two engines in the 250- to 400-horsepower range are normally used with this rig, three engines may be used when more power is required for increased pump capacity. Usually pumps such as the Ideal C-250 and C-350 are used.

Circle No. 204 on Postcard, Page 303



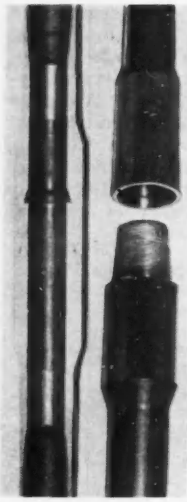
The Ideal Type 130 Consolidated Rig is normally considered for drilling in the 12,000- to 15,000-foot depth range. Included in the rig is a new drawworks designated as the type 130 and an Ideal Type "B" Sectional Drive Group which may be selected from a full range of three- and four-engine drive groups suitable for use with 6- or 8-cylinder engines in the 300- to 400-hp class. The Type 130 drawworks is rated at 1300 input horsepower. It provides six forward hoisting speeds, three rotary speeds, and three catshaft speeds. Two reverse speeds are provided for the hoisting drum, one reverse speed for the rotary machine, and one reverse speed to the catshaft. Hoisting drum of the new 130 drawworks has increased size and capacity. The large grooved drum, 30-inch diameter by 56¼ inches long, was designed primarily for 1⅜-inch line to give improved spooling and longer wire line life. The drum is long enough to permit hoisting 120-foot stands with eight lines without spooling more than three full layers of line.



Circle No. 205 on Postcard, Page 303

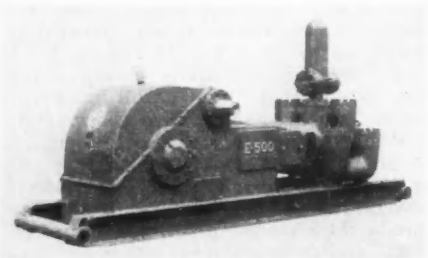
Spangseal Integral Joint Tubing is an improved oil well tubing connection developed by Spang-Chalfant Division to resist joint leakage. It consists of an integral joint with the standard API thread in conjunction with a conical sealing surface. Couplings are thus eliminated. Spangseal tubing is claimed to be highly leak resistant because of its conical sealing surfaces.

Circle No. 206 on Postcard, Page 303



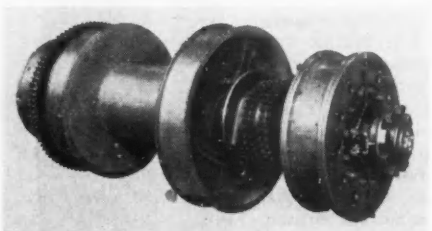
Spangweld Drill Pipe is a new product on which a welded connection is employed between the tool joint and the upset ends of the drill pipe. Every type and size of joint now in common use is available as well as many different combinations of joint and pipe o.d.'s that cannot be furnished when screwed connections are used. Hard-faced tool joints are optional in standard sizes. Hard-facing material is inlaid by automatic welding equipment in six bands. Three pads spaced 120 degrees apart around the 18-degree taper of the elevator shoulder are also provided.

Circle No. 207 on Postcard, Page 303



The Ideal Type E-500 Power Slush Pump, with 7¾-inch maximum fluid cylinder liner bore, 14-inch stroke, is rated at 500 hydraulic horsepower output at 70 spm. The pump design incorporates a fabricated power end similar to that used on the Ideal Type E-700 pump. With relatively low weight per horsepower, the new pump weighs approximately 38,000 pounds. The E-500 can be used with existing rigs to replace smaller pumps when greater pump capacity is required. To reduce shock resulting from load reversals, the main bearings and connecting rod bearings are preloaded. The eccentric shaft with fabricated steel eccentrics of welded steel plate and seamless rings give ruggedness with minimum weight. The stuffing box has a single heavy Acme-thread adjusting nut and Alemite lubrication for fluid end piston rod packing. A built-in fluid piston rod oiling system insures maximum rod life.

Circle No. 208 on Postcard, Page 303



Ideal Dy-A-Flex Air Clutch is now standard equipment on five drilling rigs in one to three positions. As illustrated, the ring-shaped air chamber between clutch housing and rubber diaphragm is sealed by flanges of the diaphragm which are squeezed between side plates and internal flanges of the housing. Unitized brake shoe assemblies with large air passages have Manhattan Keylocks with new thin molded block type of lining. Linings may be replaced without removing the clutch housing from the drive shaft by removal of the end plate.

Circle No. 209 on Postcard, Page 303

The Ideal Hook Block, designed to effect maximum saving in vertical derrick space, is a combination traveling block and spring-loaded hook and connector. It is built in three sizes with working capacities of 90, 140, and 200 tons. It may be used as a hook to support the swivel bail directly, or the drilling string may be supported by the elevator with elevator links connected to the hook link support. All bolts, nuts, pins and grease fittings are recessed to eliminate dangerous projections. Sheaves are independently mounted on tapered roller bearings, each sheave held in a fixed lateral position.

Circle No. 210 on Postcard, Page 303

Type "E" Tubing Head is a low pressure tubing head for both flowing and pumping wells. The Type "E" has a working pressure of 2000 psi and a depth rating of 10,000 feet. It has a full opening body which is provided with either flanged or screwed bottom connections for seven-inch and smaller casings. Blowout preventer equipment may be readily applied to the Type "E" Tubing Head since it has an 8⅝-inch male casing thread to which a broad flat cap is attached. Interchangeable hanger types for 2⅜ and 2⅞-inch o.d. tubing add flexibility to the new tubing head. Each of these hangers is equipped with National lip type pressure actuated seal rings.

Circle No. 211 on Postcard, Page 303

C. A. Norgren Company

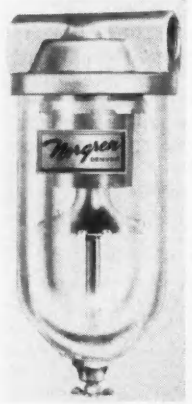
A New Filter-Drain provides automatic removal of liquids and solids from compressed air lines, with automatic drainage of collected liquids. It is designed for use in air lines to portable air tools, air cylinders and air-powered machines where removal of liquids and solids from air lines is required and where manual draining is not desired or practical. The new Norgren combination. Filter-Drain operates, automatically, under constant or fluctuating air pressure and air flow. It also continues to operate when the flow of air is cut off. There is extremely low pressure drop through the Norgren Filter-Drain, with the result that it does not decrease air equipment performance or increase compressed air costs. This new unit is available in ¼, ⅜ and ½ inch pipe thread sizes for in-line pipe connection installations. It may be used for a flow of 0-35 cfm at pressures from 0-150 psi in temperatures from 40° to 120° F.

Circle No. 212 on Postcard, Page 303

A New Precision Pressure Regulator is claimed to give exact control of pressure in the range from 0 to 30 psi at 0 to 2 cfm. It is especially suited for use with air-controlled instruments but is also applicable to any process requiring air, nitrogen or other inert gasses whose pressures must be precisely controlled. The unit operates on primary line pressures up to 400 psi with delivery pressures ranging from 0 to 30 psi. The regulator has a built-in relieving feature which prevents a build-up of excessive pressures.

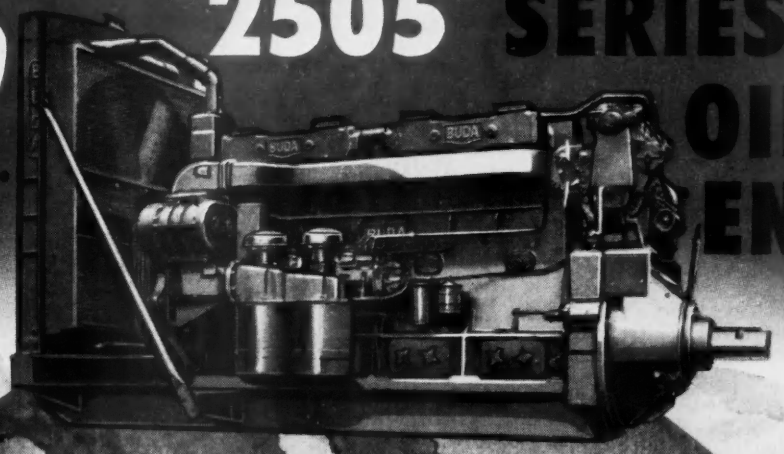
Circle No. 213 on Postcard, Page 303

A Replaceable Transparent Bowl for air filters provides a clear view of filtering results and shows when draining is necessary. The Norgren filter removes corrosive moisture and abrasive pipe scale and other foreign matter from compressed air lines of ¾- and 1-inch pipe sizes. It is applicable when flow is 0 to 140 cfm, pressure is 0 to 150 psi, and temperature is from 40° to 120° F. The transparent bowl holds a pint of water and sludge without draining. The baffle plate traps precipitated moisture, pipe scale, etc., in "Quiet Zone" in bottom of bowl, and the sediment can be drained out by opening the drain cock. The filter bowl can be removed for cleaning by unscrewing one nut.



Circle No. 214 on Postcard, Page 303

Be on top . . . WITH BUDA "2505" SERIES OILFIELD ENGINES



BUDA

WHEREVER THERE'S OIL THERE'S BUDA ENGINES PARTS AND SERVICE

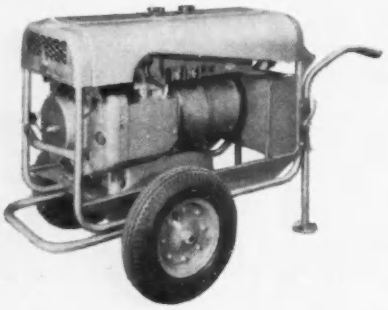
Buda "2505" Series Oilfield Engines and the "Fuecomizer Kit"* give you a world of power, acceleration and smooth operation PLUS double protection from high fuel costs. Get on top of the oilfield power problem with "2505" Series Engines. Ask your nearby Buda Oilfield Distributor for details today.

**Permits quick, low-cost conversion from full Diesel to full gas operation, or vice-versa.*

BO-25

BUDA Oilfield Distributors are located in: Dallas • Tulsa • Los Angeles • Houston • Oklahoma City • Seminole • Wichita Falls • Shreveport • Bakersfield • Tinsley • Pampa Great Bend • Long Beach • Kilgore • Mt. Carmel, Ill. • Alice • Odessa • Casper • Denver • Brookhaven • New York City (Export) and in Canada at Calgary and Edmonton

National Cylinder Gas Company



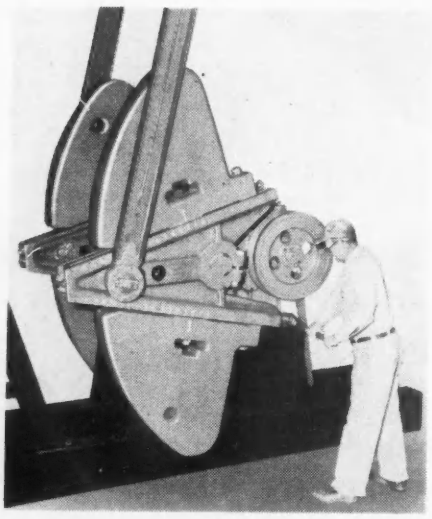
The Sureweld D-C Welder is a portable gas driven welding machine. It weighs 365 pounds and is mounted on large rubber-tired wheels—one man can move it, and two men can lift it. The welder has air-cooled engine, heavy-duty generator, dual controls for exact ampere and voltage adjustment. The machine can be used for construction, maintenance and repair, including pipe line work, wherever portability is desired. It burns electrodes up to 5/16 inch. For heavy welding, two machines in parallel will handle quarter-inch electrodes.

Circle No. 215 on Postcard, Page 303

Oil Well Supply Company

"Oilwell's" New 46-G-25 Twin Crank Pumping Unit is designed for deep wells. It has a 230,700 inch-pound API peak torque capacity and can be operated at a 74- or an 84-inch maximum stroke. The beam rating for the 74-inch maximum stroke is 25,700 pounds, and for the 84-inch maximum stroke 24,100 pounds. To convert the unit from 74- to 84-inch maximum stroke, it is only necessary to (1) reverse the position of the offset saddle trunnion assembly on the walking beam and (2) move the samson post back several inches on the base and insert bolts in the second set of holes provided. No change in the foundation is required. The unit has the new adjustable Type "F" crank. Without base extension, over-all length of unit is 28 feet, and base is 20 feet, 5¾ inches.

Circle No. 216 on Postcard, Page 303



"Oilwell's" Type "F" Crank for the 46-G-25 pumping unit permits easy regulation of counter weight effect by screw adjustment. Several sizes of weights can be provided depending upon the counterbalance effect required.

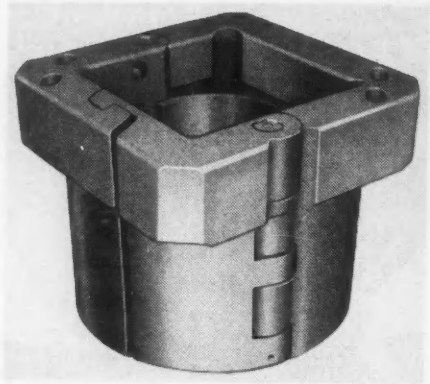
Circle No. 217 on Postcard, Page 303

"Oilwell" Pumping Unit Wrist Pin Drive Nut is a blind-end nut which can be screwed on to pumping unit wrist pins, after removal of the regular nut, to permit their being driven out of the crank with a sledge hammer.

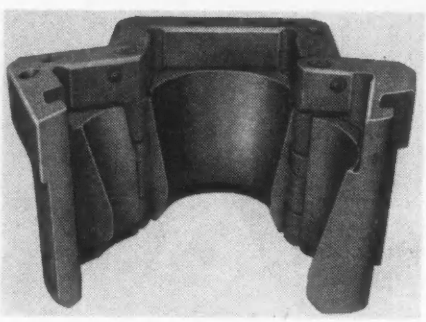
Circle No. 218 on Postcard, Page 303

"Oilwell's" new No. 66 Drawworks and 550 Drive is designed for drilling to 7500 feet. A six-speed forward, two-speed reverse mechanical drive can be furnished, or a simple conversion gives a three-speed forward, one-speed reverse torque converter rig. The new rig has large diameter long drum for maximum wire line service, large, internally water cooled brakes and extra capacity chain drives. Width can easily be reduced to eight feet for moving. Modern friction clutches and air controls are incorporated.

Circle No. 219 on Postcard, Page 303



Closed



Open

New "Oilwell" Self-Locking Master Bushings are available with API dimensions. They are designed to prevent the weight of the pipe from distorting the turntable. The radial forces, imparted to the rotary by ordinary master bushings when holding heavy loads in slips, are eliminated.

Circle No. 220 on Postcard, Page 303

"Oilwell"-Neilsen Di-Hard Liner Pumps are uniformly accurate and true to size through every foot of their length, because they are assembled from accurately manufactured, individual liners. Each liner is securely locked to adjacent liners by a tight-fitting steel band and held in the jacket by collars. The entire liner assembly is then honed and polished to exact size. The liner column is free from assembly and jacket distortion and presents a Di-Hard barrel for a free traveling, close fitting, wear resisting Di-Hard metal plunger.

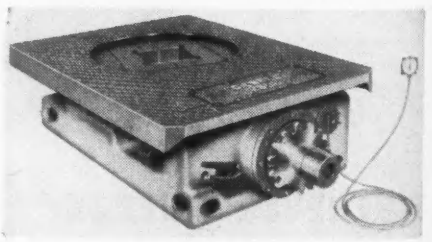
Circle No. 221 on Postcard, Page 303

"Oilwell"-Neilsen Di-Hard Skirt Type Plungers for subsurface pumps are so constructed that the wear resisting Di-Hard plunger is free from impact and mechanical loads. Its only function is to provide a hard, wear resisting surface and consequently an effective pump seal. Major hydraulic loads are carried, clear through to the bottom plunger valve, by a heavy steel tube. The Di-Hard metal plunger is made with steel inserts so that it hangs, like a skirt, from the top without clamping strains and is free from lengthwise stress and with internal and external pressure equalized.

Circle No. 222 on Postcard, Page 303

New "Oilwell" 26-HD Heavy Duty Oil-bath Rotary is built with a heavy steel turn table with 26 inch opening to support the heavier drill pipe loads now required as drilling goes deeper. "Oilwell's" lubrication system is used on this rotary to provide complete lubrication of the gears, main bearing and holddown ring bearing regardless of the speed of operation; assure continuous circulation of oil; and prevent any loss of oil.

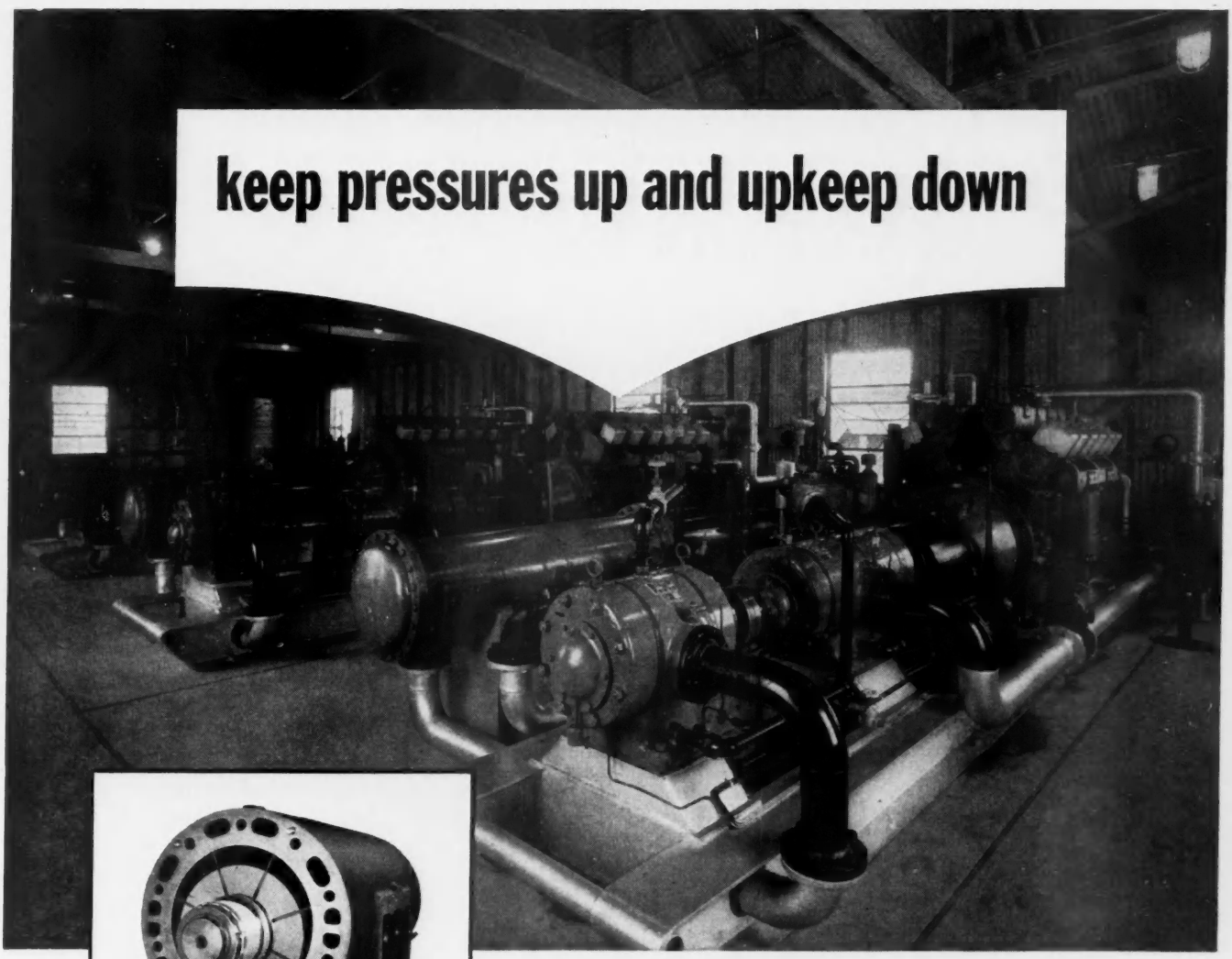
Circle No. 223 on Postcard, Page 303

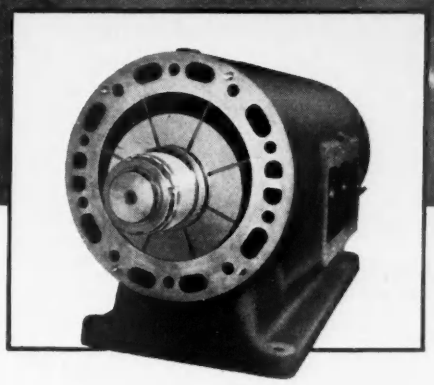


Rectangular Guards for "Oilwell" Rotaries are now standard equipment. They have a safety tread to give surer footing for the drilling crews. The guards are flush with the top of the pinion housing cover. A door at the back of the guard provides access to the oil-filler cap and oil level gauge. This new design makes it easier to fit the flooring.

Circle No. 224 on Postcard, Page 303

keep pressures up and upkeep down





Three two-stage Natural Gas Boosters in operation near Stinnet, Texas. Each direct-driven by a gas engine at 800 rpm., handles 1,770,000 SCFD, and boosts pressure from 10 to 120 psig.

Once again, Fuller Rotary Compressors have been chosen to give natural gas a king-sized boost. Texas gas men know when they install a Fuller Compressor that upkeep is low . . . that they'll get a life-time of dependable, continuous service.

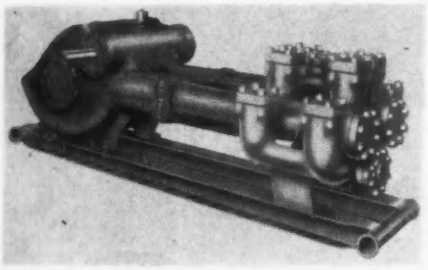
There are no valves or other complicated mechanism in a Fuller Rotary Compressor. Moving parts—rotor, bearings, and blades—are few. Vibration-free, pulsation-free, and free from bearing take-up! Blades automatically compensate for wear, thereby insuring full compressor capacity for the life of the machine. It all adds up to one of the simplest and most efficient compressors available.

Fuller engineers are ready to offer estimates and plans for any compressor installation, whether for gathering lines or for general booster work. Write for Bulletin C-5 for complete information on Fuller Rotary Compressors.

FULLER COMPANY, Catasauqua, Pa.
120 So. LaSalle St., Chicago 3
420 Chancery Bldg., San Francisco 4

fuller

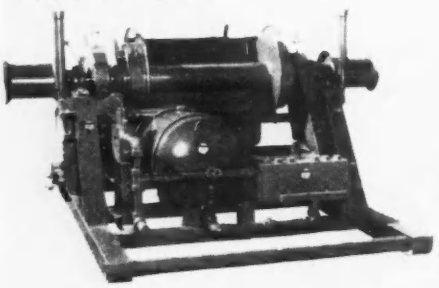
C-207



"Oilwell" No. 510-P Duplex Power Pump is a 10-inch stroke power pump equipped with roller bearing power end, single-helical gears, oilbath and positive-flow lubrication. For pipe line use it is available in 5-, 4½-, 4-, 3½-, 3- and 2½-inch liner sizes with snap-ring pistons, and has maximum capacity of 9450 barrels per day against 1500 psi line pressure using the largest liner size. Recommended brake horsepower is 116 with speed up to 85 rpm. Special fluid end parts are available so that this pump can be adapted for slush and general service applications.

Circle No. 225 on Postcard, Page 303

Oklahoma Machine and Supply Company



The Hydraulic Casing Pulling Machine is skid mounted, and can be used on a truck or on ground. It has a six-cylinder high pressure hydraulic pump which is connected to high pressure relief valve and to a 40-gallon oil tank. The pump case is fabricated steel, and the crankshaft is mounted on ball bearings. Intake and exhaust valves are "screwed-in" to allow easy replacement without damage to pump head. Working parts are in oil bath. Drum shaft is mounted on pillow block bearings with drum floating on shaft. The drum is equipped with heavy duty brakes and can be driven by friction or positive clutch. Heavy steel catheads are mounted on the drum shaft. The drum shaft and pump are driven by a "254" Ford industrial type engine with four-speed transmission.

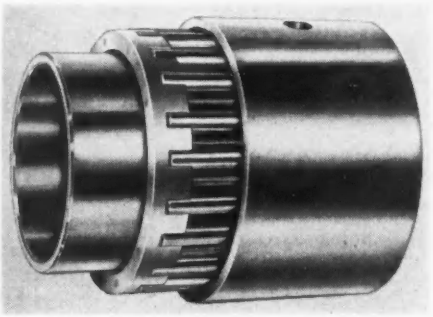
Circle No. 226 on Postcard, Page 303

Oil Center Tool Company

A New Dual Flow Control, a companion unit to the JE Flow Control, is a compact dual assembly so designed that by simply changing the flow bean sage nipples the operator can use positive choke beans of any manufacturer. The Dual Flow Control replaces six different fittings: cross, two wing valves, two choke assemblies (either adjustable or positive), and bottom hole tester top assembly. With the new flow control the operator may switch the flow from one sized choke to another without closing in the well and thus changing any of the well's characteristics. All parts are replaceable. Dual Flow Controls are claimed to effect a cost saving ranging as high as 75 percent when used to replace 10,000-pound test conventional double wings. Weight savings, according to the manufacturer, range from 30 to 85 percent, depending on the style of conventional double flow wing tree the dual unit replaces. The opening through the valve seats is one inch plus in diameter and adequately permits flow volumes up to those going through a ¾-inch choke.

Circle No. 227 on Postcard, Page 303

Orange Roller Bearing Company



Type JRCS Orange Journal Roller Bearings offer maximum load carrying capacity in restricted radial space. This type of bearing is available in several widths and may be used without the inner race on hardened shafts, or as roller assembly only, operating on hardened surfaces. The bearing is available for shaft diameters between ¾ inch and 4 inches. The roller assembly utilizes a strong, rigid cage, having two machined bronze end rings spaced by shouldered pins. Two roller assemblies are used in the longer sizes. Hardened and ground 52100 steel is used for rollers and races.

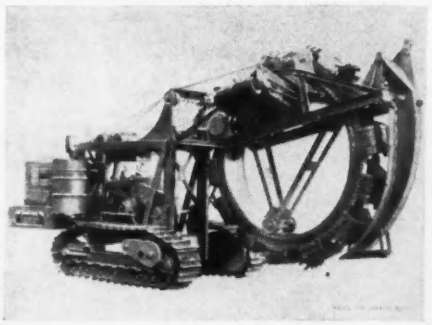
Circle No. 228 on Postcard, Page 303

Presstite Engineering Company

Peco Pipe is a plastic pipe resistant to corrosion from salt water, sour crude, naturally acid or alkaline soil, and electrolytic action between pipe and soil. The pipe is so lightweight that one man can easily handle two 20-foot lengths. The pipe is coupled with slip-sleeve couplings, cold weld cemented. Peco Pipe is made in from 1- to six-inch diameters, and all standard couplings are available. Because the smooth inner surface of the pipe remains clear, scale and sedimentary deposits, such as paraffin, do not reduce capacity or retard flow as in other kinds of piping.

Circle No. 229 on Postcard, Page 303

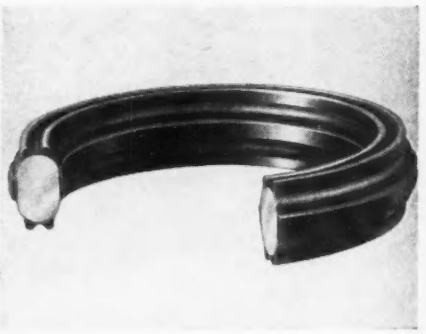
Parsons Company



Model 215 Trenchliner, a ditching machine made especially for pipe line work, is available with a choice of two standard make 55-horsepower diesel engines. It has six digging wheel speeds up to 11.2 revolutions per minute; 30 digging feeds from 6.2 inches to 18.5 feet per minute; nine trenching widths from 13 to 31 inches wide, and up to six feet deep. Standard-make, tractor-type crawlers have lug-type shoes, and 18-inch treads. Ground bearing pressure is approximately six pounds per square inch. Model 215 has friction clutch control of digging wheel, self-sharpening "Tap-In" digging teeth, and a shiftable and reversible belt conveyor for discharging spoil on either side of machine.

Circle No. 230 on Postcard, Page 303

Petroleum Mechanical Development Company



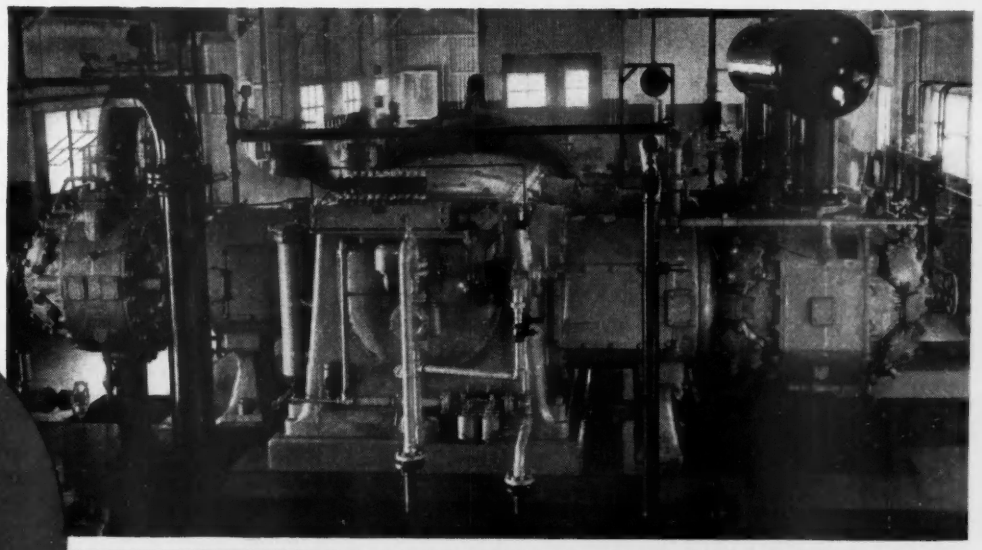
The New "Flex-Tip" ring joint gasket is available in all sizes used in well control for pressure of 2000 pounds per square inch and more. The ring embodies two independently acting seals, the first being the standard API metal-to-metal seal, and the other the Flex-Tip mechanism, which uses the interference principle in a manner similar to that of the O-ring. Inner and outer beads offer substantial protection against mechanical damage to the smooth steel seating surfaces. The gaskets are manufactured for 600 and 900 series in sizes 2 to 12 inches; for Series 1500 in 2 to 12 inches; and for Series 2900 in sizes 2 to 10 inches.

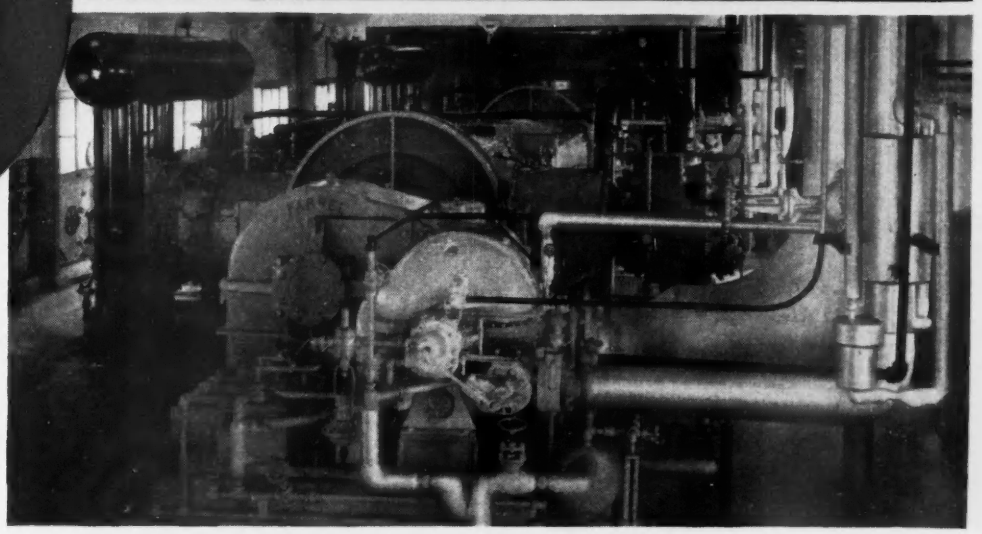
Circle No. 231 on Postcard, Page 303

H. K. Porter Company, Inc.

Porter Lubricated Plug Valves have been augmented by larger sizes to include up to 24-inch gear operated valves in semi-steel cases. Also available are 150 and 300-pound steel valves. Button type grease fittings are now standard equipment on larger size Porter valves and are also available on smaller sizes.

Circle No. 232 on Postcard, Page 303





Another Example of Efficient Power at Lower Cost

In Refinery Service . . .

COOPER-BESSEMER MOTOR OR TURBINE DRIVEN COMPRESSORS

. . . for continuous operation . . . for minimum down time

The units shown above are Cooper-Bessemer M-Line compressors in Continental Oil Company's Billings Refinery. They are turbine driven, with reduction gears, and are handling vapor and recompressor gas through 2 stages, from 17 psi to 253 psi discharge.

During their two years of continuous operation, these units have shown a typical M-Line record — smooth, trouble-free performance, minimum down time and completely satisfactory behavior in general. The reasons are simple. Combined in these units are many of the features that have contributed to the success of Cooper-Bessemer engine-driven horizontals and modern V-Angles — features that come only from years of practical experience and painstaking development work in compressor design and construction

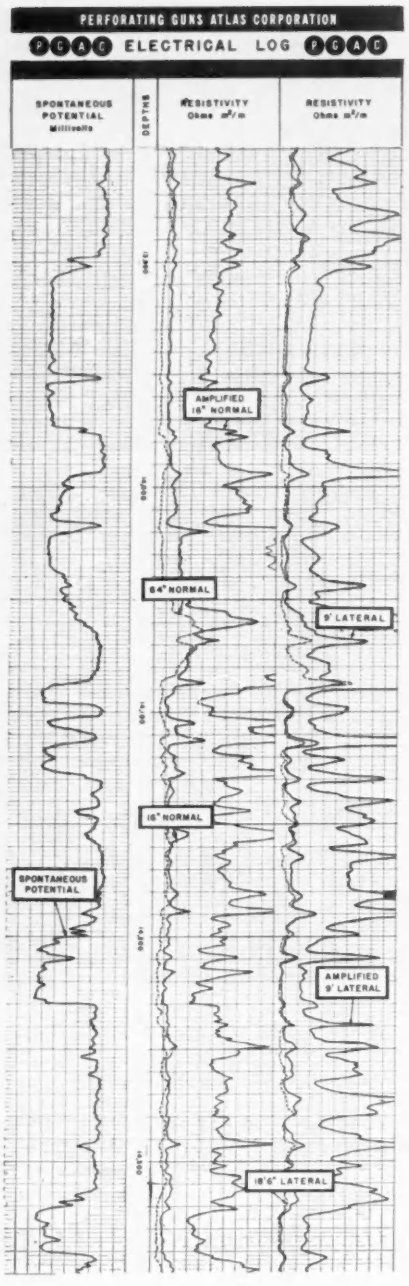
If you have new jobs coming up requiring either motor or turbine driven compressors get all the facts on modern Cooper-Bessemers. They are available in sizes from 250 to 5,000 horsepower.

The **Cooper-Bessemer** *Corporation*

MOUNT VERNON, OHIO — GROVE CITY, PENNA.

New York, N. Y. Washington, D. C. Bradford, Penna. Parkersburg, W. Va.
San Francisco, Calif. Houston, Dallas, Greggton, Pampa and Odessa, Texas Seattle, Wash. Tulsa, Okla. Shreveport, La.
St. Louis, Mo. Los Angeles, Calif. Chicago, Illinois Caracas, Venezuela

Perforating Guns
Atlas Corporation



The PGAC Electrical Log is a chart showing how the eelctrical characteristics of the formations penetrated by the drill bit vary with depth. The standard log consists of a Spontaneous Potential (S.P.) curve on the left side of the log, and four Resistivity curves in the middle and on the right side. The S.P. arises from electrochemical and electrokinetic phenomena in the bore hole. The logging tool is extremely sensitive in recording the tops and bottoms of formations, and high-speed galvanometers make it possible to record thin shales and sand streaks. Resistivity log consists of two normal curves and two lateral curves. Use of the four curves permits easier analysis of the various formation characteristics, according to PGAC. All standard curves are recorded on a single trip in the hole.

Circle No. 233 on Postcard, Page 303

PGAC Side Wall Cores are obtained by a gun which fires hollow projectiles into the formation to be sampled. The back end of the projectile is anchored to the gun body by means of a flexible stranded cable with a tensile strength of 2000 pounds. The projectile barrels, with samples of the formation, are retrieved from the walls of the hole by raising the gun in the hole. The standard gun carries 32 barrels, each of which can be independently fired by means of a selector switch in the top of the gun, which, in turn, is controlled from ground level. Maximum core obtainable is 2¼ inches long by 1 5/16 inches diameter.

Circle No. 234 on Postcard, Page 303

Simultaneous Radiation Logging records a Gamma Ray curve—with quantitative calibration indicating microroentgens per hour; a "pure" Neutron/Neutron curve which is unaffected by Gamma Rays; and a positive depth indication by means of a sensitive locator for pipe collars or flush joints. All three records are made from a single instrument on a single trip in the hole, and they are therefore interlocked and automatically correlated. For the Neutron/Neutron method of detection, PGAC uses a Slow-Neutron counter, which will not respond to anything but Slow-Neutron radiation resulting after the Fast-Neutron has bombarded and traversed the formation being logged.

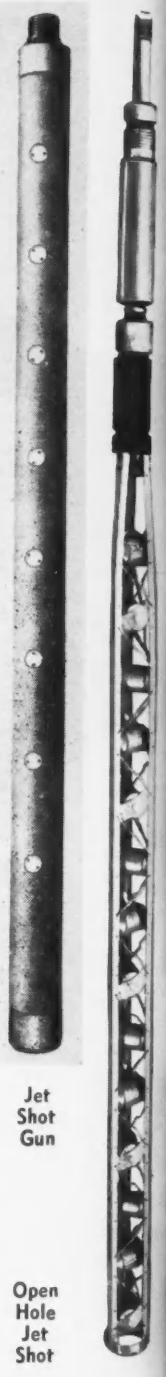
Circle No. 235 on Postcard, Page 303

PGAC Jet Shot Guns leave no debris in the hole because special threads on port closures prevent their stripping and loss in the well. The gun fires a Jet Explosive charge sealed in a bakelite case lined with a metal cone. The charge will attain velocities upward of 25,000 feet per second, resulting in smooth holes and deep penetration. Jet shooting can be used in wells with extremely high temperatures—jet charges have been tested to withstand 300° F. for 24 hours. Semi-selective firing permits several different formations to be perforated on a single run in the hole.

Circle No. 236 on Postcard, Page 303

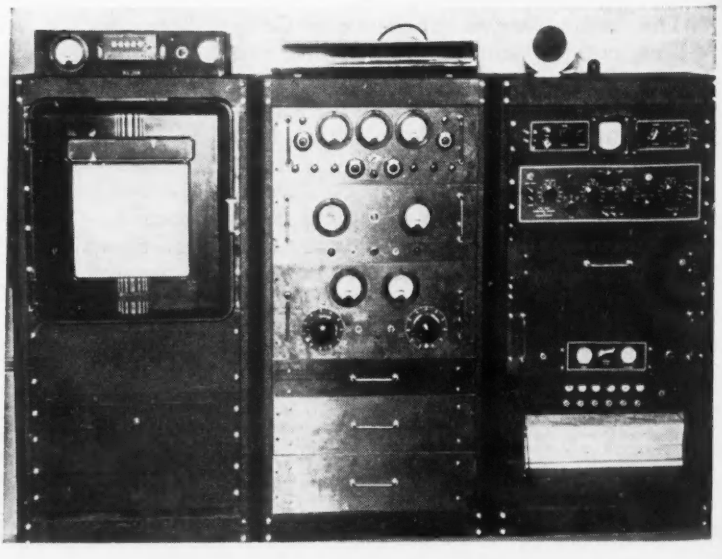
Open Hole Jet Shot is similar in operations to conventional jet shot for perforating cased holes, but it employs larger-size shot with much heavier charges of explosive. Open Hole Jet Shot is used in very tight and exceptionally hard formations—such as hard sandstones or limestones. It permits shooting close to the casing shoe without danger of damage to the casing. The open hole jet gun is available for use in 5½- and 7-inch casing. Shots are spaced 4 or 6 inches apart, and at angles of 120 degrees to adjacent shots. Guns can be extended to provide any number of shots.

Circle No. 237 on Postcard, Page 303



Jet Shot Gun

Open Hole Jet Shot



Surface instruments used for PGAC Simultaneous Radiation Logging.

Built Up..

to Oil Field Standards!

Fairbanks-Morse 8-Cover Side-Pot Duplex Power Pumps are built *UP* to the rugged design and conservative standards of oil field pump practice . . . built *UP* to last . . . built *UP* to liberal strength and safety factors.

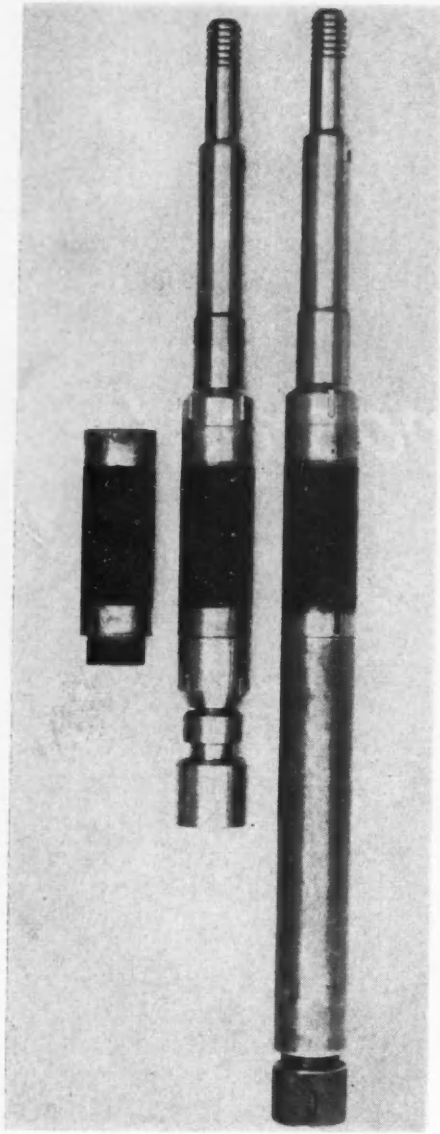
They are not built down to achieve lighter weight with consequent sacrifice in design, materials and dependability. Light weight in an oil field power pump is a dubious advantage at best. Strength and service are the important considerations.

When you want dependable, efficient, long-life, low-cost service, your choice should be Fairbanks-Morse, the power pumps that set performance and economy records wherever they are used. Fully bronze-fitted, oil-fitted, or slush-fitted styles. Fairbanks, Morse & Co., Chicago 5, Ill.

FAIRBANKS-MORSE,

a name worth remembering

OIL FIELD EQUIPMENT • PUMPS • SCALES
ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS
DIESEL, DUAL FUEL AND GASOLINE ENGINES • MAGNETOS



PGAC's collar locator, fishing bell, quick-change unit, and controller assemblies

The Electrical Collar Locator (left) is used for precision positioning of instruments and guns run on wire line and also for locating collars in logging operations. Shown at left is the collar locator, alone. The middle assembly shows it between the fishing bell (top) and the quick-change unit to which the PGAC jet gun and Baker wire line tools are attached. At right, the collar locator is shown between the fishing bell (top) and PGAC's Controller for firing selectivity control, to which the bullet gun is attached for perforating. When run inside a liner, the collar locator also detects the casing centralizer. When it is impossible to pull liners and cutting operations must be undertaken, knowledge of exact locations of screen-liner collars enables cuts to be made immediately adjacent to the collars without disturbing the wire wrapped section.

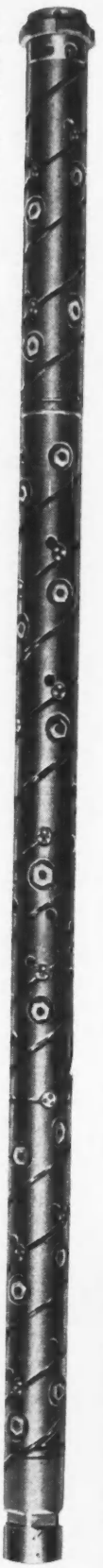
Circle No. 239 on Postcard, Page 303

The PGAC Controller, assembled between the collar locator and the bullet gun itself, contains the control devices by which firing selectivity is accomplished. The instrument controls whether 2, 4 or 6 bullet holes are shot per foot of casing. The assembly has 45 to 63 shots capacity, with perforations in four directions at 90-degree angles, and several sections of the wall can be perforated on a single trip in the hole.

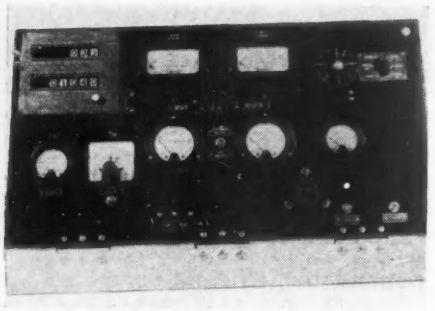
Circle No. 240 on Postcard, Page 303

The Atlas Bullet Gun is built in sections or blocks. Each block carries nine shots arranged for selective firing in three banks of three shots each. For average operations, five to seven blocks are assembled, so the gun usually carries 45 to 63 shots. Spacing between barrel centers is two inches. The gun fires in four directions, with a capacity to perforate 2, 4 or 6 holes per foot of casing. Several sections of the well can be perofrated on a single trip into the hole by moving the gun and firing selectively. The gun is available in 3⅝- and 4-inch outside diameter sizes, and the assembly is completed with a head and a fishing bell. For safety, firing of the gun requires separate, simultaneous manual action on two switches on the control board.

Circle No. 241 on Postcard, Page 303



Atlas Bullet Gun



The Dual Odometer used on the control panel of all PGAC perforating units automatically performs all computations necessary to compensate for tool lengths. This is accomplished by the two registers of the instrument. One register indicates the last three numerals only of the depth of the collar locator, while the other registers automatically and indicates separately the actual depth of the "action point" of the instrument run.

Circle No. 238 on Postcard, Page 303

Protecto Wrap Company

A New Prefabricated Protective Wrap around coating for pipe joints has a coating material of plasticized coal tar enamel reinforced with woven glass textile fabric. Strip separator sheets are included to prevent sticking in rolls regardless of temperature. The primer for this pipe wrap requires no drying time. Protecto Wrap comes in accurately measured lengths of either 30 or 50 feet.

Circle No. 242 on Postcard, Page 303

Process Solvent Company

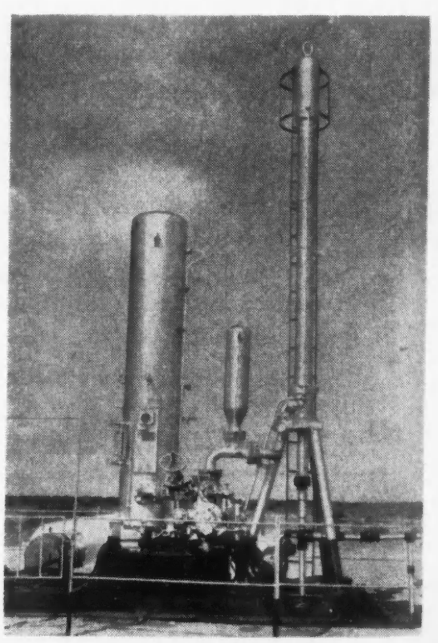
Sure-Klean No 1, a solvent for removing scale, lime and rust from engine cooling systems, is claimed to restore circulation of the coolant and stop engine overheating by dissolving incrustations that line radiator tubes and walls of motor block water passages. It can be used in radiators, motor blocks, thermostats and hot water heater cores of all types of water cooled stationary power units, diesels, cars, trucks and tractors. The solvent also has the ability to remove encrusted cement and dust from painted metal surfaces without injury to the paint.

Circle No. 243 on Postcard, Page 303

The Pelton Water Wheel Company

An Automatic Controller has been added to the Pelton Long Stroke Hydraulic Pumping Jack. On automatic time clock electric motor operation the frequency and duration of pumping periods occur at predetermined intervals without attention from the operator. The unit shown is the Pelton 350-7-10 D-P Long Stroke Hydraulic Pumping Jack with ten-foot stroke. Hydraulic cylinder is seven inches in diameter, operating approximately 12 strokes per minute. Maximum polished rod load for this unit is 20,000 pounds. The automatic control may be applied to the larger 20, 25 and 30-foot stroke Pelton models with maximum polished rod loads up to 40,000 pounds.

Circle No. 244 on Postcard, Page 303



McEvoy offers

IMMEDIATE DELIVERY

on most orders of

McEvoy VALVES

● Whether you need a 4″, 10,000 lb. working pressure, all-stainless master valve or one hundred 2″, 500 lb. flow line valves, call McEvoy for prompt delivery.

The reason is simple. Even though the demand for this outstanding valve has been rising rapidly, we have been engaged in an all-out program of expanding manufacturing facilities and contracting for materials.

Now we have a complete line of valves, good inventories and a streamlined plant that can turn out special orders in a matter of hours. You can order with complete assurance of prompt delivery.

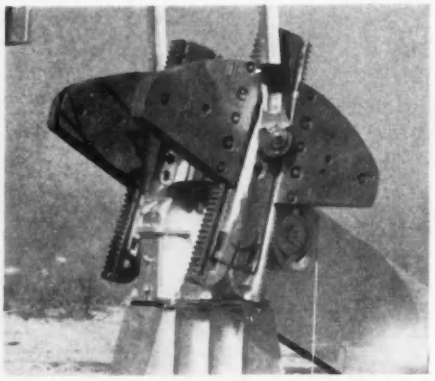
Many operators call the McEvoy Automatic Lubrication Conduit Gate Valve the finest ever made. Write or wire for price and delivery quotations.

McEvoy COMPANY

TEXAS AND MILBY ST.
P. O. BOX 3127
HOUSTON 1, TEXAS

EXPORT REPRESENTATIVE: E. F. GAHAN, INC., ROOM 1223, 500 FIFTH AVENUE, NEW YORK, N. Y.

Parkersburg Rig & Reel Company

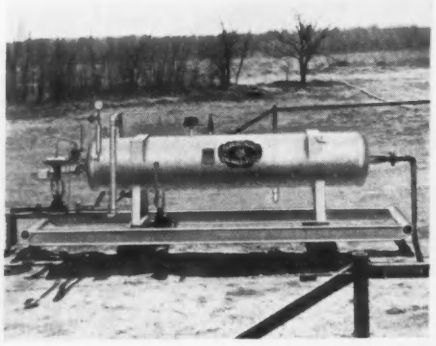


New Parkersburg One-Man Crank Counterbalance can be adjusted by one man by loosening two clamping screws and using a wrench to roll the weights to the desired position. One wrench, which is furnished with the counterbalance, fits both the clamping screws and rotates the gear that rolls the weights. A scale is cast along each face of the crank, which, with an arrow cast on the weight, indicates the amount of counterbalance obtained with any of the optional weights in any position. The method by which the clamping screws lock the weights makes it impossible for them to work loose while the pumping unit is in operation. There is a choice of interchangeable adjustable weights to provide the most economical range of counterbalance for a given well condition.

Circle No. 245 on Postcard, Page 303

Parkersburg Air-Balanced Pumpers are manufactured in six sizes with strokes from 54 to 120 inches and beam load ratings from 16,000 to 40,000 pounds. Portable, wide base units for well testing are also available. Counterbalance adjustments can be made while the unit is in operation and are accomplished by simply turning a regulator nut. Counterbalance is maintained automatically by a compressor attached to the main cylinder. Inertialess counterbalance of this type eliminates vibration and reduces shock load on bearings and gears. Longer pitmans and shorter cranks, locating the reducer between the samson post and the well provides more uniform acceleration of the rod string. Rods can be replaced safely, easily, and quickly by one man.

Circle No. 246 on Postcard, Page 303

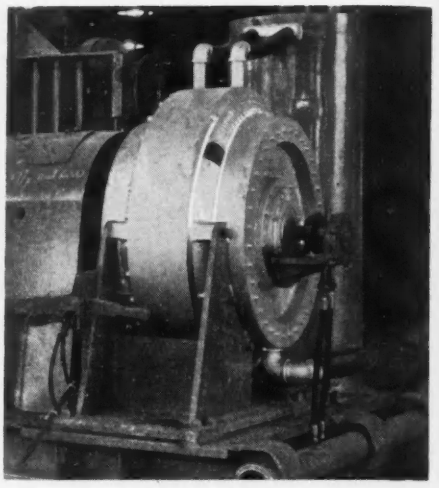


Parkersburg Single Tube Horizontal Separator obtains complete separation in one large tube instead of two smaller ones. Advantages claimed are that slower velocity of the gas stream allows more liquid to drop out, larger interface between liquid and gas assures faster and more efficient separation, there is longer retention of liquid to assure more complete separation, liquid is kept warm by contact with warmer gas stream which eliminates freezing problems during cold weather, and there is only one tube to clean out instead of two. To further facilitate cleaning, there is a drain at each end and one in the middle. The No-Bleed Liquid Level Controller eliminates troubles associated with constant bleeding types of controllers and provides freedom from trouble caused by freezing and plugged bleeder holes.

Circle No. 247 on Postcard, Page 303

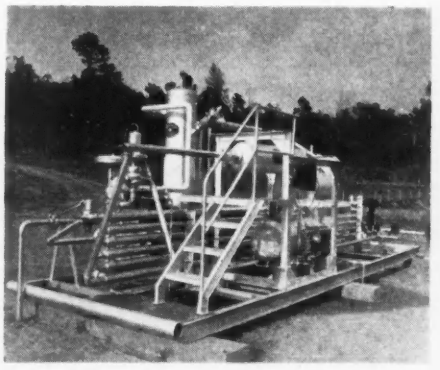
Parkersburg's Emulsion Treaters have heating tube that provides both radiant and convected heat and eliminates hot spots and scale deposits. The treaters also have inside piping for better cold weather operation, built-in heat exchanger, water knockout inside the treater, easily adjusted weir nipples, and two separate treating compartments. Connections are arranged so that treater can be hooked up from ground level. The burner hood is explosion and windproof. Large manways are provided in both excelsior and hot water sections, and provisions are made for completely separating the gas and emulsion before the fluid is treated. A "Safe Trap" prevents liquids in the fuel line from being carried into the burner. There is a type and size of treater to handle any type emulsion.

Circle No. 248 on Postcard, Page 303



New Parkersburg 48 inches Hydromatic delivers 30 percent more power than the 40 inches Double Rotor unit and is designed for drilling up to 20,000. It is particularly for use on drawworks with drum diameters from 26 to 30 inches. Shaft size and taper of the 46 inches S. R. Hydromatic is the same as that of the 40 inches Double Rotor. Thus it can replace the 40 inches D. R. on drawworks already in service with a minimum of expense. The 46 inches S. R. Hydromatic is available with new overrunning clutch which is claimed to cut round-trip time by as much as 10 percent, save shock, wear and tear on the drawworks and other equipment and assure safe automatic control of the load from the instant it begins to descend. In addition the new 46 inches Hydromatic, a new 16 inches Single Rotor Hydromatic has been developed for use on smaller drilling rigs and hoists.

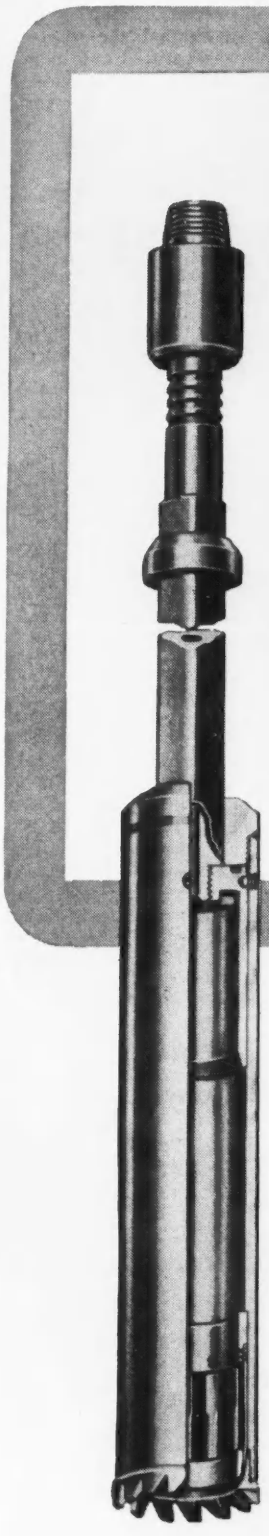
Circle No. 249 on Postcard, Page 303

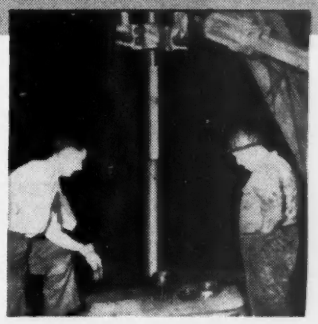


The Hyreco, a "cold separation" unit for high pressure water removal, separates condensate from gas at temperatures below the hydrate point, and utilizes the heat from the well stream to maintain the temperature of the trapped liquid above the hydrate point. Recent improvements include means to keep all internal parts of the liquid level controller submerged in warm separator liquid to prevent freezing in cold weather. Increased height of high recovery separator by 40 provides greater efficiency and dry gas for controls. There is a complete series of heat exchangers. A new three-way valve assures better temperature control in the water knockout section, and either water or complete liquid knockout, or both, may be selected. Utilization of warm, unsaturated tail gas from heat exchanger operates all controls to provide better cold-weather performance.

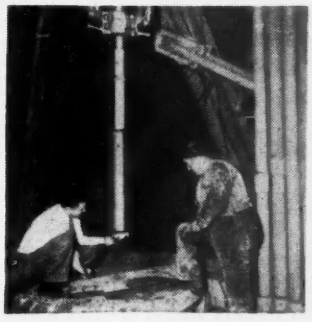
Circle No. 250 on Postcard, Page 303

if it's fishing you must do...



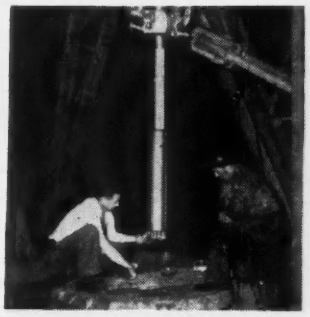


Lift with Elevators



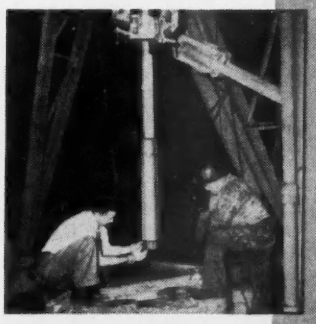
Screw on Shoe

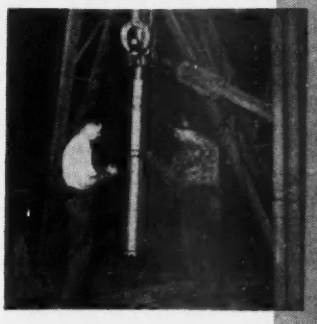
Insert Basket Fingers



Tighten Shoe

Insert Die Ring





Insert Shear Pins

one run with a

COOPER DIE-FORMED BASKET

will guarantee a catch!

- **The Cooper Die-Formed Basket is one of the finest fishing tools ever devised for recovering rock bit cones or other junk. It is invaluable around drilling wells and pays for itself in a short time. With this fishing tool, it is not necessary to circulate or make hole in order to pick up the junk. The basket fingers scrape the bottom of the hole and pick up the fish in one grab. Run by the regular drilling crew, the Cooper Die-Formed Basket is fast, sure and as easy to operate as a post-hole digger. Does the job in less than a minute on bottom.**

LUCEY

LUCEY EXPORT CORPORATION

233 BROADWAY . . . NEW YORK 7, N. Y.

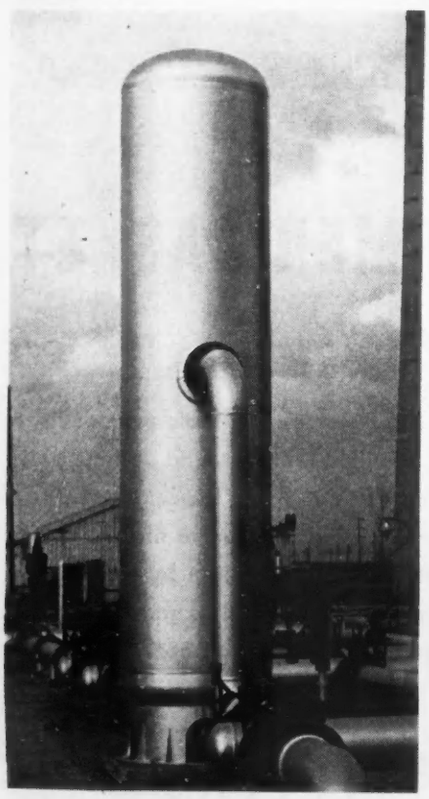
Broad Street House, London, E. C. 2, England • Sterling Building, Houston, Texas
• Calle Defensa 320, Buenos Aires, Argentina • San Fernando, Trinidad, B. W. I.
• Calgary and Edmonton, Alberta, Canada

Parelex Corporation

Model 440 is an induction type electric heater for oil wells operable on 60-cycle, alternating current 120 volts, 230 V, 440 V, field power or generator. These heaters are applicable to oil field production problems where heat is indicated for heavy crude or removal of paraffin. The heaters are formed on standard J-55 two-inch upset tubing and make up into flow lines or tubing strings. They may also be installed under the pump for heating bottom hole fluids. Model 440 is 12 feet long with a four-inch outside diameter seamless boiler tubing case. Weight is 120 pounds. Output ranges up to 100,000 Btu per hour, and maximum insulation voltage rating is 600 volts. No special cable is required to run the Parelex heater down the well.

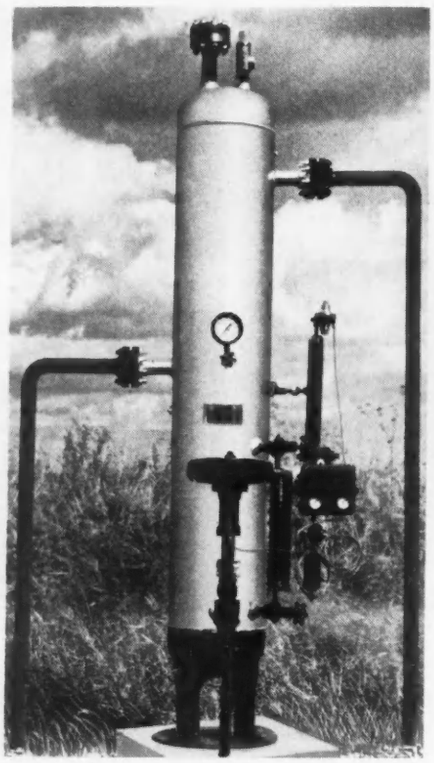
Circle No. 251 on Postcard, Page 303

Peerless Manufacturing Company



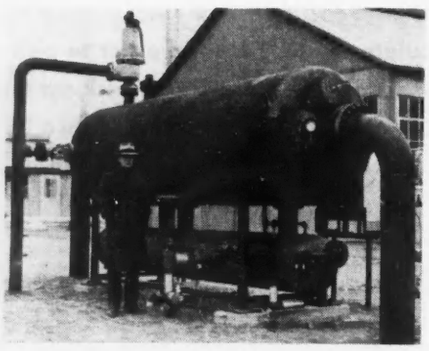
Peerless Gas Scrubbers are designed to handle extremely high gas flows, with large amounts of entrained liquids. They can be used for plant inlet scrubbers, compressor station inlet scrubbers, gathering system scrubbers and as a scrubber on any high volume system. Each scrubber is equipped with the Peerless vane type Mist Extractor. This Mist Extractor reduces the entrainment loss to less than 1/10 gallon per million standard cubic feet of flowing gas. These units can be supplied for design pressures up to 2000 psi and for any gas flow. They are equipped with torque leveltrol, diaphragm operated oil valve and pressure gauge. Connections are provided for high level alarm, relief valve, and safety head.

Circle No. 252 on Postcard, Page 303



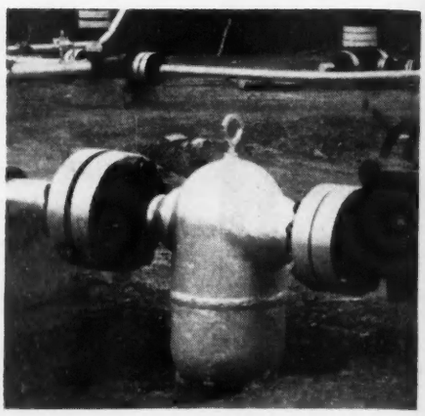
A 967 High Pressure Oil and Gas Separator provides a solution to the problem of low flow high pressure distillate wells. It is designed for 967 psi maximum pressure. The separator is equipped with the Peerless Vane type Mist Extractor. Controls provided are a torque tube leveltrol, diaphragm motor valve, reflex gauge column, pressure gauge and relief valve. It has been designed for wells making moderate amounts of liquid. The separator is really suited as an inlet scrubber on packaged dehydration, desulfurization, and gasoline plants.

Circle No. 253 on Postcard, Page 303



Peerless High Pressure Horizontal Separators provide separation of high pressure well streams, and are particularly effective in the separation of foaming crudes. These separators are double barreled horizontals. The upper barrel is filled with the Peerless Hi-Surface Vane unit, which essentially consists of closely spaced vertical plate. Pockets are riveted onto the side of these plates. As the gas passes through this unit, a gentle rolling action causes all particles of liquid to contact the plates. In this way liquids are separated and foam stabilized. These separators are provided with torque tube leveltrol, diaphragm operated oil valve, relief valves pressure gauge and gauge glass assembly. They are available in pressures up to 3000 psi.

Circle No. 254 on Postcard, Page 303



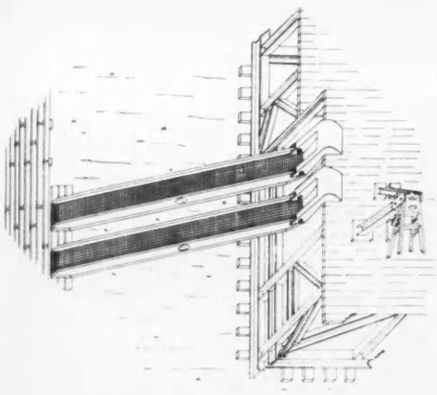
Peerless Injection Well Separators are designed to remove entrained lubricating oil foam natural gas prior to injection back into the formation. This prevents lubricating oil foam clogging of the sand face, which can lead to the need to backflow a well. The Peerless Injection Well Separators thus eliminate the need of backflowing. They are recommended by the manufacturers for cycling and gas storage operations. These separators contain the Peerless Mist Extractor unit which maintains efficiency from zero to maximum rated flow. These units can be supplied for line sizes of two to six inches and design pressures of 5000 psi.

Circle No. 255 on Postcard, Page 303

Portable Bridge & Equipment Company

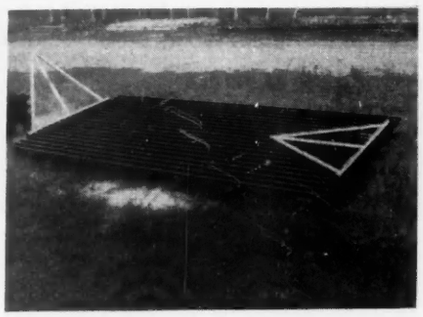
A New Unitized Drilling Rack includes a pipe slide, safety-tread stairs, loading platform, catwalk, sills, and braces, all built as one compact unit on a skid, shown loaded for transporting. Installation requires only that the skid unit be set down in the V at the proper position for the catwalk. The pipe slide and stairway are raised into position with a catline. The sills, complete with braces, fold out accordion-like from each side of the catwalk. Adjustable columns and steel bearing pads support the complete rack over uneven ground. Erection time is not over 30 minutes with four inexperienced men; dismantling time is 20 minutes.

Circle No. 256 on Postcard, Page 303



A New Portable Truck Ramp provides access for loading at both high and low levels, commonly found on mast-type power rigs. It is designed for 100,000-pound loads. The erection time for each height level is approximately 30 minutes. Steel grid decking provides safe traction and is self cleaning. It comes in two sections which are easily transported on ordinary float-type bodies along with other drilling equipment. It is ruggedly built for oil field use.

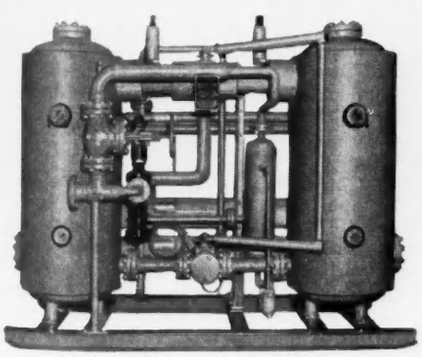
Circle No. 257 on Postcard, Page 303



The Bridge Type Cattle Guard is designed for maximum oil field loads and will bridge a span of 12 feet. It is built in two sections of 7 feet 6 inches x 12 feet which bolt together at the center to make a 12 foot x 15 foot cattle guard or bridge. The initial two sections come with the wings attached. The wings fold down for ease in transporting. Where greater road widths are required, any number of sections without wings can be added as desired. The sections are of all-steel, rail-type, welded construction.

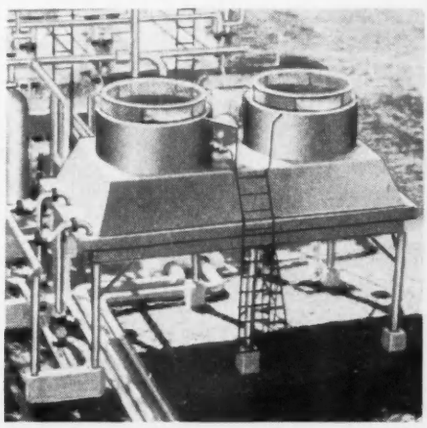
Circle No. 258 on Postcard, Page 303

J. F. Pritchard & Company



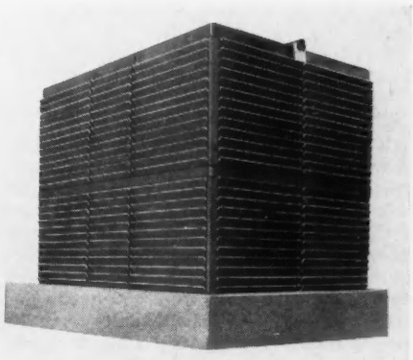
Types HAF, A, B, and D Packaged Hydryers for removal of water vapor to 40° F. dew points from air and other gases under pressure. Models are available for either intermittent or continuous drying and can use various solid adsorbent agents as required for meeting specific applications, the adsorbents themselves being reactivated by either steam heated or electrically heated atmospheric air. Units may be explosion-proof; manual, semi or fully automatic in control, and may be enclosed for outdoor installation. Completely prefabricated and assembled prior to shipment, each model is ready for drying operations after service connections have been made.

Circle No. 259 on Postcard, Page 303



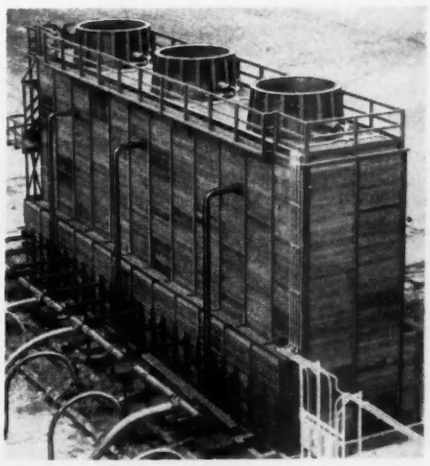
Type B "Quintair" Air Cooled Heat Exchangers are designed for the "high-temperature level" heat rejection required by modern internal combustion engines. Units are available in wide range of sizes, suitable for any installation of 300 horsepower or more. Jacket water and lubricating oil cooling can be combined in a single structure containing separate coils for each service. Induced draft arrangement assures more even distribution of air flow through the unit to prevent "cold spots," a major cause of freeze-up in forced draft type units. Recirculation of heater air is prevented by high velocity of air discharge from the unit. No radiator cores are used. The round finned tube heat transfer sections are designed for a working pressure of not less than 100 psi. Full 5/8 inch O.D. tubes minimize plugging, fouling and corrosion.

Circle No. 260 on Postcard, Page 303



Series SR12 Cooling Tower, a new packaged model expressly suited for light jacket water cooling service, is available in nine sizes. All wood is selected All Heart Redwood to assure steady, maintenance-free performance. This is an atmospheric pressure type tower easily and quickly assembled from materials already cut to proper size. Complete, detailed building instructions accompany each package, the only tools being required for assembly are a hammer and a wrench. Pipe, bolts, nuts, and washers are galvanized steel. Nonclogging spray nozzles are cast from bronze.

Circle No. 261 on Postcard, Page 303

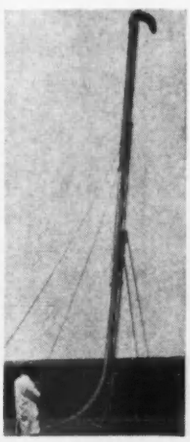


Series "J" Induced Draft Cooling Tower is designed for heavy duty industrial applications requiring high heat transfer rates and features the Olin Fan Throat. Internal deck arrangement and the high tower structure are engineered to provide maximum water break-up with minimum air recirculation and ice formation. The Olin Fan Throat, of modified Venturi design permits a tolerance of only ¾ inch between blade tip and stack for fan efficiency.

Circle No. 262 on Postcard, Page 303

Pyrene Manufacturing Company

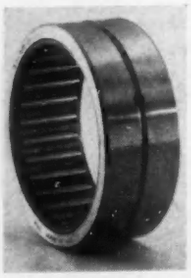
The Pyrene Foam Tower is a portable device for discharging fire-smothering foam in large volume to the top of a tank not equipped with foam inlets or to a tank where the fixed inlets have been damaged by fire or explosion. The tower is especially adapted to use at floating roof tanks, which normally do not have system protection. Mobility over rough terrain, ease and speed of erection by a minimum number of men, and efficient application of foam are claimed for the tower. The equipment is assembled in two sections — a base with screw-tilting gear mechanism and four spikes for use in case of rough ground; and a telescoped 20-foot, three-section tower with manual winch, two swivel-jointed push poles and stainless steel guy ropes. A six-inch foam column ends in a heat-resistant stainless steel discharge head.



Circle No. 263 on Postcard, Page 303

Roller Bearing Company of America

RBC's Pitchlign Bearing eliminates the normal cause of roller bearing failures before they can occur.

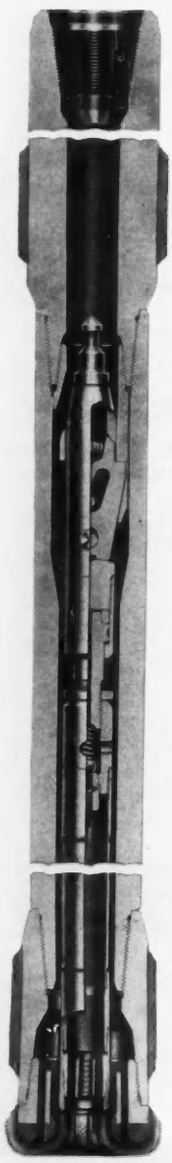


This small diameter caged roller bearing, designed for catheads, sampson posts, sheaves crown blocks and other difficult applications, can be mounted vertically or horizontally—and used with high speed shafts. Cage contact is limited to the ends of the rollers, and only at their pitch circle. This limits roller skewing to a fraction of that normal to other means of roller guidance, the manufacturer states. The full length cage is free floating, and not subjected to a thrust load. Positive cage alignment is assured by the outer race shoulders. Rollers are of uniform diameter throughout their entire length.

Circle No. 264 on Postcard, Page 303

Reed Roller Bit Company

The new Reed Diamond Head Wire Line Core Drill eliminates round trips to recover cores—cores can be recovered and examined every foot, if desired, without a round trip. Drilling characteristics of the new core drill are comparable with conventional diamond core drills. In some areas and formations it will often penetrate faster and stay in the hole longer than rock bits. Its operation is similar to the standard Reed "BR" Wire Line Core Barrel and the manufacturer states that it will give similar core recovery and low cost per foot as the standard Reed "BR." Large area slush openings in the diamond bit remove the cuttings from the bottom of the hole. Ample clearance between the drill collar and the wall of the hole also reduces the danger of sticking the barrel. The new core drill is available in either 10- or 23-foot lengths and is furnished for rental service only.

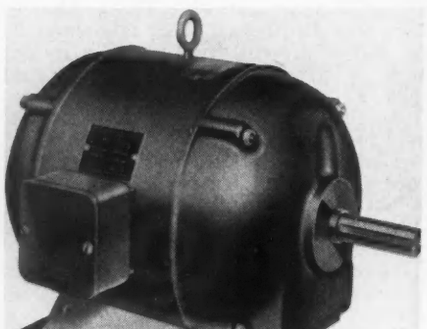


Circle No. 265 on Postcard, Page 303

The Reed Twin-Blast Rock Bit has a new fluid nozzle which directs two powerful blasts of drilling fluid directly against the bottom of the hole. In addition to effectively carrying away cuttings, the turbulent fluid stream also cleans the cutter teeth. The streamlined shape of the nozzle assembly minimizes slush erosion. Nozzle openings are made of tungsten carbide to resist the severe abrasion of the high-velocity fluid stream, and nozzle diameters remain substantially constant throughout the life of the bit, assuring uniform drilling efficiency. Twin-Blast Rock Bits can be furnished in all types, 7⅝ through 12¼ inches, and with nozzle diameters of 9/16, ⅝, 11/16 or ¾ inch.

Circle No. 266 on Postcard, Page 303

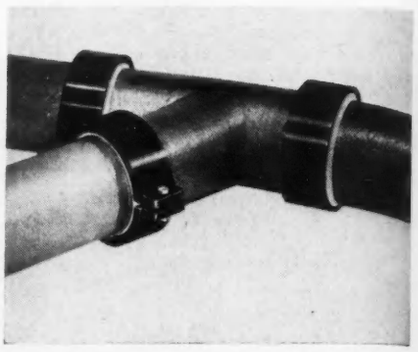
Robbins & Myers, Inc.



The R & M "All-Weather" line of motors has been augmented by four new frame sizes, and now includes 125-horsepower ratings. Highest previous rating for R & M motors was 50 hp. All steel parts of the new motors have a baked-on, rust-resisting undercoating of "Robbinite." The rotor assembly is treated with a rust-inhibitor and the cast iron end-heads and terminal box are cleaned and given an anti-corrosion treatment of zinc chromate. Power lead-ins are sealed at the motor shell with a non-hardening compound. Wide, prelubricated ball bearings containing special greases resist dust, temperature, humidity and speed. The four new models are made in NEMA frames 444, 445, 504 and 505.

Circle No. 267 on Postcard, Page 303

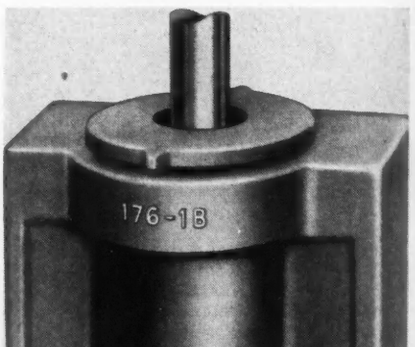
The Robinson Clay Product Company



Robinson Screw-Seal combines plastic and vitrified clay to form a leakproof, infiltration-proof joint. Clay pipe is manufactured with a male-threaded polyvinyl chloride Plastisol casting at each end. A phenolic plastic collar with matching female threads fits onto the stationary pipe and the next length is screwed into the collar. Three turns by hand and one by strap wrench, and the joint is complete. The joint is resistant to most acids and gases. It is available in 4-, 6- and 8-inch internal diameters, and in three-foot lengths.

Circle No. 268 on Postcard, Page 303

J. P. Ratigan, Inc.



The Ratigan No. 176-1B Lubricating Cap provides the polished rod with continual lubrication by means of felt rings which are constantly supplied with oil through a wick from the oil reservoir within the cap. It is designed for all Ratigan No. 175 and 176 stuffing boxes, and is installed by simply using it to replace the present cap of the stuffing box. This cap is particularly adapted for oil wells that head, as the design of the cap assures continual lubrication of the polish rod, until the regular flow of oil occurs. The oiling system in the lubricating cap is distinct from the self-oiling system of the stuffing box. The oil in the cap requires a manual filling of the reservoir, while the stuffing box reservoir has its source from the oil in the tubing.

Circle No. 269 on Postcard, Page 303

Diesel truck with 4½" by 8" triplex pump used for acidizing and other fluid treatment of wells, combines application of high pressure with high volume.

Calibrated chemical tank is divided into 2-500 gallon compartments.

Heavy duty winch behind cab facilitates maneuverability in deep mud.

With this equipment Texas Acidizers, Incorporated offers service for their excellent lines of acid solutions, surface-active and deemulsification agents, formation sealing and blocking materials, gels for temporary plugs and selective treating, corrosion and scale preventers and paraffin solvents.

TEXAS ACIDIZERS, INC. Seguin — Beeville — Premont, Texas

Why Drill a Dry Hole?

PROVEN GEOPHYSICS

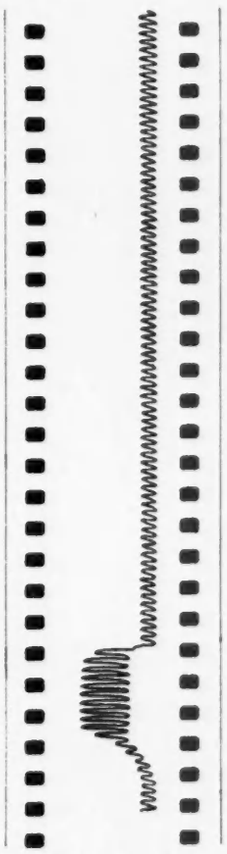
The Amazing Attractometer

The latest and most modern method of geophysical exploration that shortens the route to petroleum reserves by rigid instrumental recordings, indicating the existence or not of hydrocarbon accumulations, the approximate depth and quantity underlying the tested area; ten locations for a major oil company without error. Surveys conducted on acreage basis for cash fee and chance to earn small override, oil payment, leases or other interest, where saturation is indicated in commercial quantities. Full information on request.

To establish conclusive proof of the accuracy of our geophysical work, we will test and record on tape bearing your signature one or more wildcat locations in advance of drilling, indicating the existence or not of petroleum in commercial quantities underlying the tested areas and at what depth it may be found.

GEOPHYSICAL SURVEY SYNDICATE

4133 Sunnyslope, Sherman Oaks, Calif. Phone STate 46903



Specimen of tape indicating saturation

JUSTRITE... for EXTRA SAFETY!

JUSTRITE

The SAFE WAY to handle and pour flammable liquids!

SAFETY FILLING CANS

Spout cap automatically opens and closes. Swinging handle balances load. Heavy coated steel body. Built to last. Flexible spout for easy pouring. Underwriters approved and listed. 3 gal. and 5 gal. sizes.

OILY WASTE CANS

for all kinds of rags or oily waste flammable material. Heavy duty for extra protection. Cover closes automatically. Carrying handle. With or without foot lever. 4" high sturdy legs. Underwriters approved and labeled. From 6 to 25 gallons.

Approved by Underwriters Lab., Inc. and Factory Mutuals

ORDER FROM YOUR JOBBER

JUSTRITE MANUFACTURING CO.

FREE CATALOG
Write Dept. WO
2061 N. Southport Ave. CHICAGO 14, ILL.

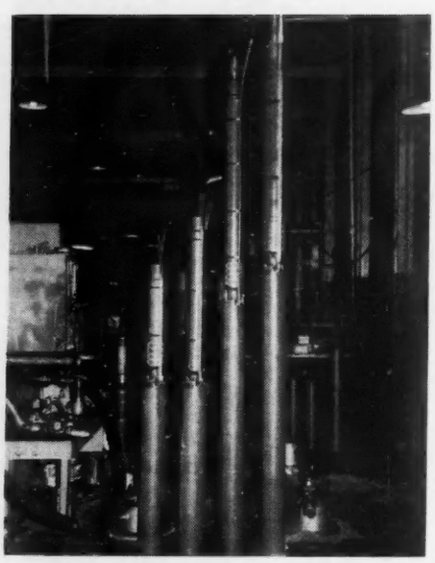
The Ridge Tool Company

The New Ridgid "500" Pipe and Bolt Threading Machine is a self-contained die head. The new Quadritype Die Head is instantly adjustable to thread one- to two-inch pipe, including over and under size, regardless of position of quick-opening lever and without removing dies or die head from the machine. Dualtype Die Heads, one for ¼ and ⅜ inch, and one for ½ and ¾ inch, also offer instant size change. Monotype Die Heads, ⅛ inch to 2 inches, and bolt die heads, ¼ inch to 2 inches, which adjust to over and under size in the machine, are also available. All tools in the new "500" thread, cut and ream independently and close to the chuck, and swing up out of the way when not in use. Thread oil system is entirely concealed. Thread and length gauge has large

numerals. Chuck has six adjusting pinions. Motor supplies ample power even for pipe up to 12-inch when geared tools are used, is universal forward-reverse, 115 volts, 25 to 60 cycles, AC or DC single phase, light socket power.

Circle No. 270 on Postcard, Page 303

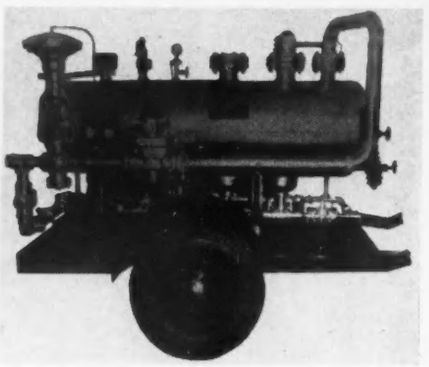
Reda Pump Company



"Reda-Submergible" designates the complete line of submergible pumping units for use in field camp wells, drilling water wells, and other field applications in which fresh or salt water is desired. These pumping units are simple to install, built of corrosion-resistant materials throughout, and are unaffected by adverse weather, according to the manufacturer. Pump models range from 7 to 450 gallons per minute; motor ratings from .4 to 22.5 horsepower; lifts from 20 to 2300 feet. Models to 20 gpm require only four-inch inside diameter cased wells.

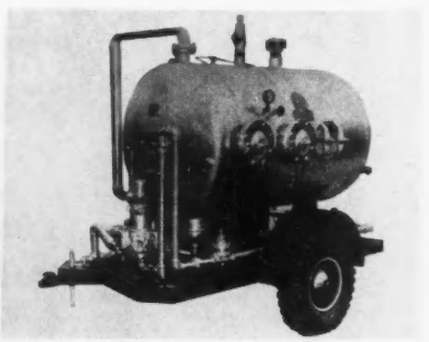
Circle No. 271 on Postcard, Page 303

Rolo Manufacturing Company



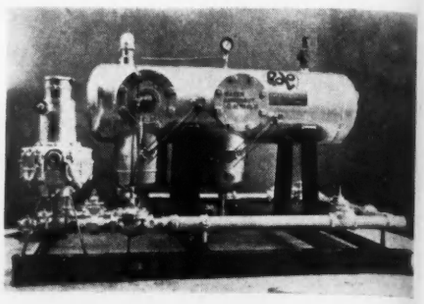
No. 6H-2046 Wellchecker is a compact portable well testing unit using a 24-inch by 6 foot 600 pounds per square inch working pressure horizontal oil and gas separator, with oil meter and pilot loaded dump valve. It is used on larger-than-average wells for periodic well tests, gas/oil ratio tests, drill stem tests, potential tests, etc. Welded gas run has facilities for metering gas and a diaphragm type gas back pressure valve for maintaining constant pressure on the unit. Oil and gas outlet tie-in line permits rejoining the oil and gas after metering, if desired. Wellchecker has facilities for addition of, and can be supplied with, automatic free water knockout on unit, which removes and meters free water produced.

Circle No. 272 on Postcard, Page 303



Rolo Wellchecker Type 1 H-4806, is a large capacity, low pressure, portable well-testing unit with a 48-inch outside diameter x 6 feet seam-to-seam x 150 pounds per square inch working pressure horizontal oil and gas separator. It is piped, with orifice fitting and diaphragm type back pressure valve. The Wellchecker also has an automatic free water knockout, by means of which free water is segregated in the water compartment of the separator, its level controlled by a weighted float, and water is metered by water meter when discharged from the separator. Additional oil meters are available manifolded in parallel to enable the unit to handle high rates of oil flow. Available either trailer or skid mounted, the large-capacity unit provides means for making periodic well tests, drill stem tests, and potential tests, and for determining gas/oil ratios and other data.

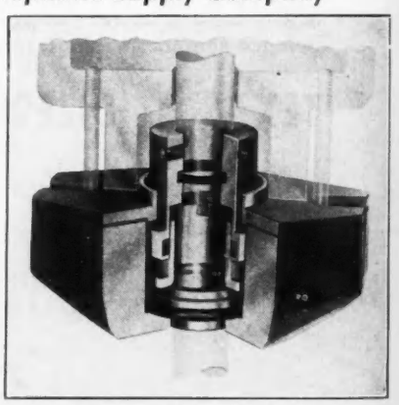
Circle No. 273 on Postcard, Page 303



Rolo Wellchecker No. 4-1H-1604 above is a low cost oil and gas separator completely piped with oil meter. It is a low pressure, low capacity unit suitable for making periodic well tests, drill stem tests, and potential tests, as well as determining gas/oil ratios on prorated wells and small strippers. The separator is 16 inches outside diameter x 4 feet seam-to-seam x 150 pounds per square inch maximum working pressure, API-ASME code-labelled, and may be equipped with automatic water knockout, where free water is prevalent. This unit handles from 5 to 400 barrels per day, with a maximum of 200,000 cubic feet of gas.

Circle No. 274 on Postcard, Page 303

Republic Supply Company



The Repsco Rotary Shaft Seal is designed to overcome the problem of sealing revolving shafts in fluid handling equipment. The seal is hydraulically actuated and balanced with existing fluid pressure within the pump stuffing box. Flexibility of the rotating element compensates for shaft deflection and end thrust. Coil springs are protected from fluid contact, and the highly lapped contacting surfaces and precision-machined component parts insure a positive leakproof seal. The seal is fabricated to fit any pump without costly alterations.

Circle No. 275 on Postcard, Page 303

N. C. Stearns Company

Fleet-Line Pipe Line Vents quickly identify the pipe line company, the line location, and type of line. Made in malleable steel, the vents are finished in weather-resisting enamels in contrasting colors of the customer's choice. Company emblem is cast integral with the front face of the vent, and other lettering may read "Oil Pipe Line" or "Gas Pipe Line." On back there is a 2 x 4-inch brass plate for stamping location identification. The brass plates are interchangeable, and are attached with metal drive screws. A countersunk Allen Head set screw for locking vent to pipe is optional. Vents are made for two- and four-inch pipe.

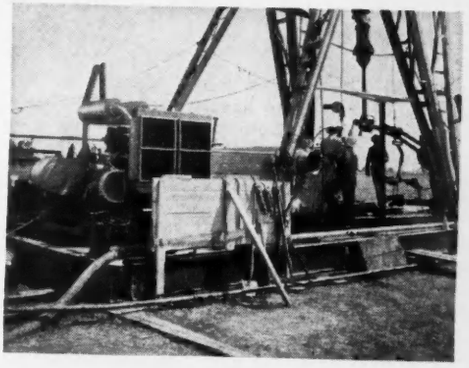
Circle No. 276 on Postcard, Page 303

GM Diesel
Case History No. 517-28

USER: T. M. Pruett, Centralia, Ill.

INSTALLATION: Two GM "Twin 6" Diesels, installed January, 1949, powering Unit U15 Drawworks and an A10 Emsco triplex mud pump.

PERFORMANCE: Owner reports this rig completed a round trip at 3,800 feet in 1 hour and 15 minutes, setting back doubles. It drilled 4,000 feet in 14 days through McCluskey, Devonian and Trenton formations (a good record for rigs in this area). In Frogtown area rig drilled 2,200 feet to Devonian in 4 days, 6 hours.



This Diesel made 3800-foot round trip in 75 minutes

"I switched to GM Diesels in 1947 for one good reason—they make more money for me," says T. M. Pruett, who has been drilling in the Tri-State area since 1938. "They make faster connections and round trips—cost us less to operate and are easier to service and maintain." General Motors Diesels enable drillers to get on bottom quicker and make faster round trips because of their fast-stepping 2-cycle operation. These power-packed units fit within road width, which makes them easier to move. Parts and accessories are readily accessible, and expert GM Diesel service assistance is never far away.

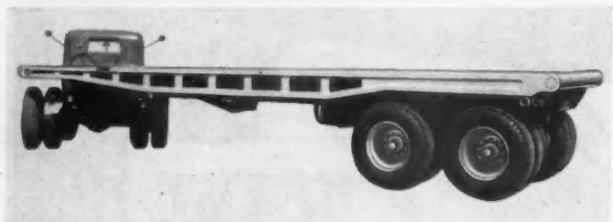
DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICHIGAN
SINGLE ENGINES...52 to 275 H. P. MULTIPLE UNITS...Up to 800 H. P.

It pays to Standardize on

Write for booklet, "A 50,000,000 Horsepower Insurance Policy" that tells you why.

GM
GENERAL MOTORS
DIESEL POWER

Spencer-Safford Loadcraft, Inc.

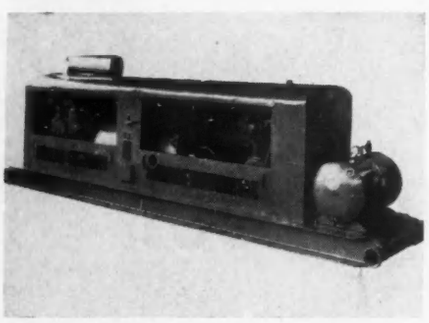


(Left.) Loadcraft oil field float.

Loadcraft Oil Field Float has a new high tensile pressed steel frame and deeply trussed 14-inch body platform. Equipped with the Spencer True Beam Axle which is made expressly for trailer use, the oil field floats are constructed to carry the heaviest oil field loads. Loadcraft "S" camber brakes with oversize cam rollers are used. Standard pipe pickup hook for nose loading and ball bearing rolling tailboard are added for convenient loading. The float also has flat end compensating springs, rubber bushed radius rods, and either air, vacuum or electric power.

Circle No. 277 on Postcard, Page 303

Stewart & Stevenson Services, Inc.



Models 30DA and 30GA, larger size all-electric types, have been added to the standard line of oil field utility units. Model 30DA is powered by a Model 3-71 GM diesel engine operating at 1550 rpm. Standard equipment includes a 30 kilowatt direct current lighting generator, 30 cubic feet air compressor (electric motor driven), 40-gallon air receiver tank, and 1½ inches wash down pump 125 gpm at 60 psi, electric motor driven. Specifications for Model 30GA are the same as those for Model 30DA except that this unit is powered by a gas engine instead of a diesel. On these new units, the accessories are individually driven by splash-proof, ball bearing electric motors of standard make, which are capable of operating for many years with practically no attention. This arrangement also adds flexibility since the speed of components such as the centrifugal pump can be varied without changing engine speed, or interfering with the lighting operation. The units are skid-mounted for portability and are protected from the elements by a light weight sheet enclosure with removable side panels for easy access to the working parts.

Circle No. 278 on Postcard, Page 303

The William E. Sievers Corporation

Kingseal, an engineered additive developed for lost circulation areas of normal size, is inner-sealing, rather than forming a scab at the lost circulation point. It consists of wool, cotton, jute, synthetic fibers (such as rayon and nylon), and white pine sawdust of a varied and determined particle size. The sawdust starts the plugging action, and as the fibers (wool, cotton, etc.) interlace and adhere to every shape of the thief formation, the sawdust fills in the interlacings until a sheath or plug of almost felt-like material has been formed. The strength of this interlocked and interlaced plug is such that the more pressure put against it the greater the adherence of the parts to one another. The result, a tailored plug to fit each interstice, crack or crevice. Since no important scab exists at the lost circulation point, the running in and out of the bit or core barrel cannot interfere with the sealing. Kingseal can be used in clay base mud, oil emulsions, or oil base mud, and is immune to chemical action and bacterial deterioration.

Circle No. 279 on Postcard, Page 303

Queenseal, a bulk product, was developed for lost circulation areas that require masses of material. It is composed of processed inert wood fibers, strong pliable textile fibers, and resilient selected particles of white pine sawdust. The bulk, or processed inert wood fibers, creates a strong firm base. As this base forms within the enlarged cracks, crevices, fissures, or caverns, the fine textile fibers interlace with the coarser bulk material, forming a mesh. The particles of sawdust fit between the interlocked fibers, adequately plugging the interlaced interstices and forming an effective lock. Queenseal can be used in any type of clay base mud, oil emulsions, and oil base mud, and is immune to chemical action and bacterial deterioration.

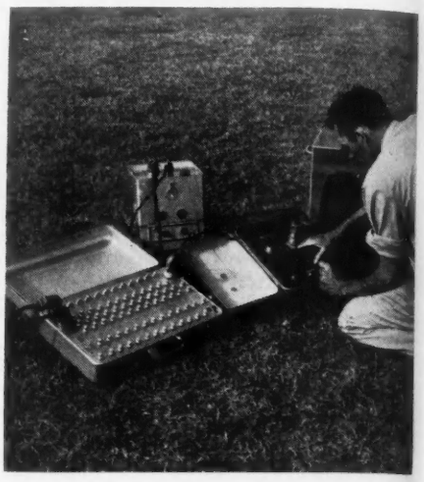
Circle No. 280 on Postcard, Page 303

Sunshine Iron Works

The New S-I-W Drill Collar Rack is a device to safely and quickly lock drill collars into standard derricks. Drill collars are moved in against bar and into individual locks flipped down into position as collars are added to rack. It is located to the side of the monkey board and installation adapter is hinged so that rack can be raised and tied against derrick when rack is not being used. Standard model rack accommodates seven stands of 6¼ inch drill collars, weighs approximately 180 pounds, is 78 inches long, in length, and 20 inches wide.

Circle No. 283 on Postcard, Page 303

Southwestern Industrial Electronics Company



The P-11 Portable Seismograph is a completely portable unit which can be transported by five men. All units are designed to fit on a back pack, and the heaviest single piece of equipment weighs less than 50 pounds. The portable seismograph units retain the characteristics of standard truckmount equipment, but they may be taken over all types of terrain, into areas that are impassable for standard equipment. They may be used in all climates.

Circle No. 281 on Postcard, Page 303

Southern Mill & Manufacturing Company

New Model Sturdybilt Prefabricated House for oil fields is a modified ranch-type home available in two- or three-bedroom designs. The house pictured has redwood decorative siding with Johns-Manville Asbestos Siding Shingles. This model, like all Sturdybilt Houses, is made of 4 x 8-foot wall sections and is easily transported by truck. It can be erected on any type of foundation in days.

Circle No. 282 on Postcard, Page 303

Safety Tower Ladder Company

The Tower Ladder Safety Device consists of a wide, strong belt, metal sleeve, and carrier rail attached to the ladder. In use, the climber snaps the safety belt to the traveling sleeve, slips the sleeve onto the carrier rail, and climbs. The locking mechanism stays open as long as he climbs up or down in normal position, but if he slips and puts weight on the device in any but the normal position, the locking mechanism automatically goes into action. The device locks within six inches of the spot where it is when the user slips or falls, and stays where it locks until manually released.

Circle No. 284 on Postcard, Page 303

S & S Specialties

A New Speaking Tube permits conversation to and from any part of the derrick regardless of noise interference. The standard hookup on the speaking tube is from driller-to-monkey board-to-crown, but it can be used in various places around the rig. The tube is made of heavy, galvanized flexible tubing and can be furnished with polyvinyl covering. The heavy aluminum mouthpiece is installed on all terminals. A steel container is provided.

Circle No. 285 on Postcard, Page 303

THE MOST COMPLETE LINE

There are almost 1500 types and sizes in Laughlin's quality line of drop forged fittings.

There are many different styles of shackles, swivels, hooks, thimbles, clips, sockets, eye bolts and other products designed for a wide variety of applications throughout industry. If you use wire rope or chain, you can be sure that Laughlin has the right — *and safest* — fittings for the job.

THESE EXCLUSIVE PRODUCTS

Safety "FIST GRIP" Wire Rope Clips . . . Fool proof, easy to install Fist Grip clips hold rope more securely, can't go on wrong. Fewer clips are required than for ordinary types, and they will not crush or distort the rope.

SAFETY HOOKS . . . The latch locks the load, will not open until released by operator. Strong, drop forged steel hook has improved latch that leaves 80% of throat opening. 15 sizes; 3 patterns, eye, shank and swivel.

"MISSING LINK" (Reg. U.S. Pat. Off.) . . . Cheaper than welding, safer than cold shut or cast link, "Missing Links" go on in a jiffy and are stronger than proof coil chain. 17 sizes from 3/16" to 1⅞".

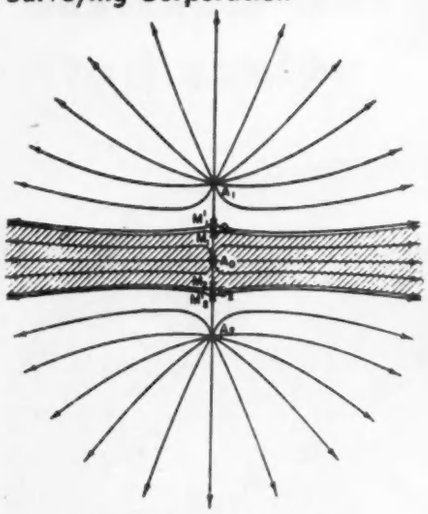
CLEVIS GRAB AND SLIP HOOKS . . . These sturdy hooks are easily attached to any welded link chain. Pin and cotter make it easy to attach or remove for use on another job. Needs no connecting fittings or special tools.

Laughlin's new Catalog No. 150 lists the complete line of drop forged wire rope and chain fittings with illustrations, description and specifications. Write for it today.

LAUGHLIN THE THOMAS LAUGHLIN CO.
513 Fore Street
Portland 6 Maine

THE MOST COMPLETE LINE OF DROP FORGED WIRE ROPE AND CHAIN FITTINGS

Schlumberger Well Surveying Corporation

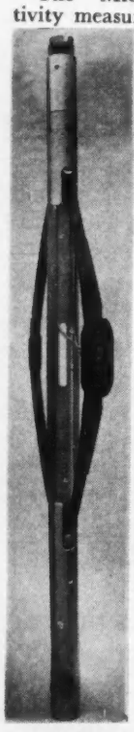


Laterolog-Current Distribution

The Laterolog is a new resistivity method in the electrical logging field, which is claimed to have advantages in special applications. Actually it functions most favorably where conventional methods are least useful, i. e. in salt saturated muds. Opposing voltages prevent the surveying current from spreading up or down the hole through the mud column so that it is effectively focused in a thin sheet on each successive formation. As a consequence, the reading represents only the resistivity of the formation opposite the electrode system. Furthermore, because the current is focused, the mud column has no effect on the measured resistivity. Resulting advantages claimed are direct readings close to true resistivities; accurate formation detail in salty mud and hard formations; excellent definition on thin beds.

Circle No. 286 on Postcard, Page 303

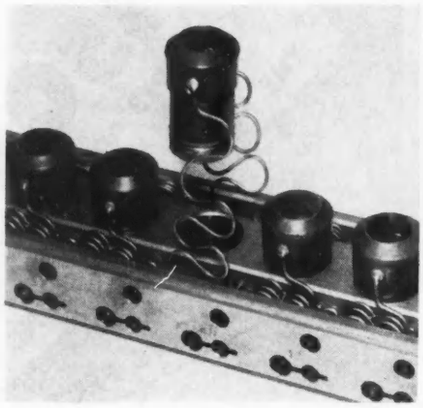
The "MicroLog" is a record of resistivity measurements made with electrodes at short distances from one another applied to the wall of the bore hole. The influence of the mud column is practically eliminated by an insulated electrode support. The very short spacings, usually one and two inches, permit resistivity measurements to be made on microvolumes of formation along the face of the bore hole. As a result, formation changes are recorded with detail. Formations which have reservoir possibilities must be permeable, and therefore will absorb filtrate from the drilling mud. As a consequence, mud cake develops on the wall of the bore hole in front of potentially productive zones. Because of the short spacings, "MicroLog" values are influenced by these mud cakes. Proper analyses of the "MicroLog," coupled with information obtained from electrical and section gauge surveys, determine potentially productive reservoirs.



Micrologging Sonde

Circle No. 287 on Postcard, Page 303

A New Large Percussion Sample Taker has been introduced with improvements in design of bullets, chambers and gun body. Powder loads have been increased. The core diameter has been enlarged to 1 3/16 inch. The new guns are built in 30 shot blocks and are 8¾ feet long. They can be used in holes 7 inches in diameter



and larger. As was the case with the earlier models, bullets are fired individually and are placed at the desired depth by recording an SP curve on an electrode close to the gun. The correct depths can then be obtained by adjusting the recorded SP depth to that of the electrical log. Cores recovered with the new equipment are large enough to permit quantitative analysis of the physical characteristics and saturation.

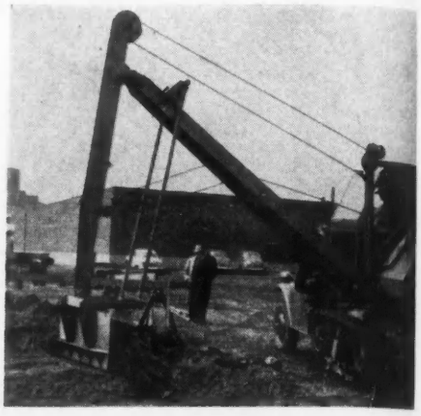
Circle No. 288 on Postcard, Page 303

Seismograph Service Corporation

The Complete Lorac Type "A" System is used for positioning geophysical operations over the Gulf of Mexico. It consists of three transmitting stations, set up on land and normally spaced about 40 miles apart, and one or more mobile-receiver boat-mounted position indicators. The continuous radio waves of frequency broadcast by the land stations are detected and phase compared by a mobile-receiver indicator unit as shown in the foreground. Any number of these receivers may be operated at the same time. The indicator unit displays on its dials at all times the position of the boat with respect to a hyperbolic grid overlaying a map. The accuracy of this method of positioning is claimed to be sufficient for all types of geophysical operations within a range of 100 miles offshore. This service is provided by Lorac Service Corporation, a subsidiary of Seismograph Service Corporation.

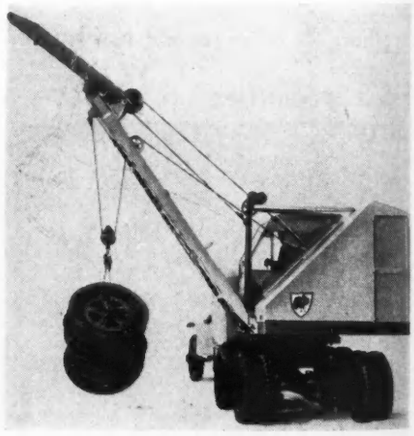
Circle No. 289 on Postcard, Page 303

Schield Bantam Company



A New Backfill Attachment for quick mounting on the Bantam Back Hoe has a parallel linkage arrangement which keeps the backfill blade perpendicular to the ground throughout the entire "dozing" action, thus enabling the blade to retain a full load from start to finish. The blade width is 5 feet, height 2 feet. When attached to the standard 14 feet Bantam Back Hoe boom and 6 feet stick, this backfill blade has a maximum reach of 23 feet 6 inches and works to within 6 feet of the center of machine rotation. It is capable of back-filling 350 feet of trench per hour. Operator with Bantam Back Hoe and new backfill attachment can dig trench and complete filling operation with one machine.

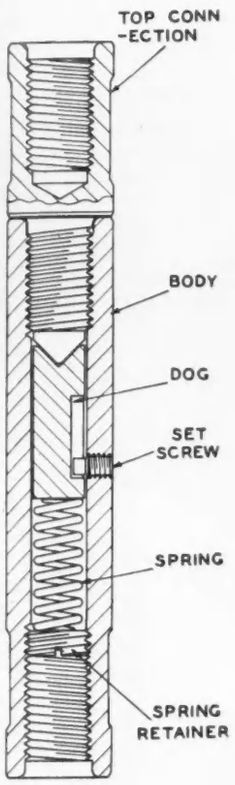
Circle No. 290 on Postcard, Page 303



A New Crane Adaptor converts the standard Bantam Back Hoe boom to a 2½-ton capacity crane. The conversion is made on the job by removing the back hoe bucket, inserting a 10-inch sheave near the boom tip, re-reeving the drag cable and threading crane hook. Crane Adaptor thus uses same boom, same stick and same one-man operation for unloading and spotting pipe sections. Lifting capacity can be increased through the addition of out-riggers to the truck on which the machine is mounted. This new Crane Adaptor, along with the Bantam Backfill Attachment, makes a versatile "3-in-1" combination machine of the Bantam Back Hoe. Trenching, hoisting, placement and backfilling operations are all carried out by one Bantam.

Circle No. 291 on Postcard, Page 303

Two "NEW" Products That Will SAVE YOU TIME TROUBLE and MONEY...



The NIXON HYDRAULIC TUBING ANCHOR

The primary use of this tool shown at the right is to increase the effective length of the pumping stroke, at the working barrel, by eliminating "tubing stretch" in oil wells equipped with sucker rod type pumps.

It also anchors tubing to casing thereby eliminating tubing collar wear, tubing wear, and casing wear. The anchoring is automatic, based strictly upon static fluid load build-up in the tubing.

To unseat the tool it is only necessary to equalize the fluid level in the tubing and casing by opening the release valve, which is a part of the tool.

The WILSON SUCKER ROD SAFETY JOINT

The Wilson Sucker Rod Safety Joint shown at left is used to eliminate "rod stripping jobs" which are encountered when sub-surface pumps are sanded up, or stuck due to other reasons.

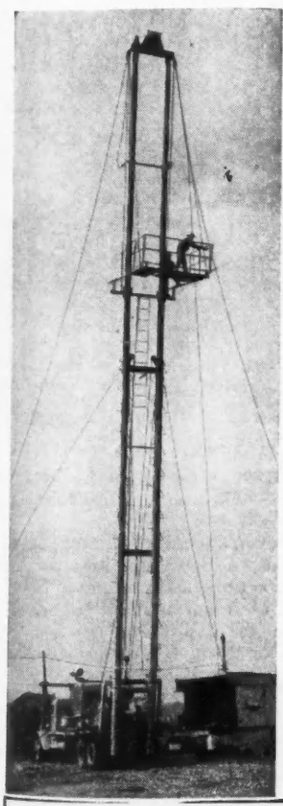
The safety Joint is installed in the sucker rod string immediately above the pump. It is so designed that the top connection will back out of its box when the sucker rods are rotated to the left, thereby making it possible to pull the entire string of rods before pulling tubing.

Can be used time after time without the replacement of any parts.

Contact Your Supply Store or Write

WILSON FOUNDRY & SUPPLY CO.

1417 ELYSIAN ST. — HOUSTON, TEXAS



S & R *Custom Built*

PORTABLE TELESCOPING POLE MASTS—

This S & R double ladder mast is of heavy welded steel construction, and is fabricated of 10¾" pipe and 8⅝" pipe. Overall dimensions when erected 87 feet to crown support beam and 52' when telescoped in traveling position. Approximate weight of the complete equipment is 12,000 lbs. The complete assembly includes the (1) poles, (2) breakdown shaft assembly, (3) attached racking platform (which positions itself when poles are raised), (4) pole adjusting screws, (5) a sheave assembly to be mounted on truck or trailer for raising the poles, (6) and a four or five 24 inch sheave crown block for ⅞" line. Available for truck, trailer, or skid mount.

For additional information write, wire, or phone.

S & R TOOL & SUPPLY CO.
P. O. Box 1755 — 155 McCarty
HOUSTON 1, TEXAS
Export: Mid Continent Supply, 42 Broadway, N. Y. 4, N. Y.

S&R TOOL & SUPPLY CO. HOUSTON, TEXAS

. . . another reason why drillers prefer

Standco NO-SMOKE BRAKE LINING

There's no grabbing when Standco Lining is used. It has a nice feed-off and slight lever pressure controls the heaviest strings of pipe.

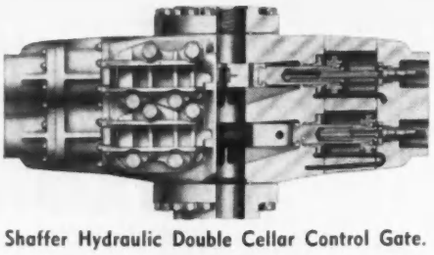
More deep wells have been drilled with Standco than with all other blocks combined.

Be sure Standco No-Smoke Brake Lining is on all your rigs.

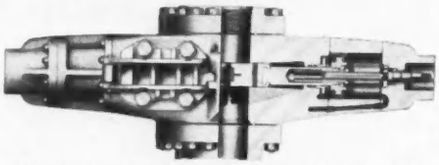
STANDCO BRAKE LINING COMPANY
Factory and General Offices
2701-2801 Clinton Drive — Houston, Texas

Shaffer Tool Works

Shaffer Hydraulic Cellar Control Gates, are now available in both Double and Single Gate designs. In both designs the construction and operating features are similar, the principal difference being that the Double Gate contains two separate ram compartments unitized into the one body to provide double gate protection in a unit of unusual compactness—only 30 inches over-all height even in sizes as large as 13⅜ inches (12 inches, Series 900). With this type gate, the rams in one compartment can be equipped for closing off around the drill string while those in the other compartment are equipped for closing off open hole. Thus, regardless of whether pressure emergencies occur while the drill string is in or out of the hole, a choice of rams is available for shutting off the well.



Shaffer Hydraulic Double Cellar Control Gate.



Shaffer Hydraulic Single Cellar Control Gate.

For operations where double protection is not necessary—or where the operator prefers to install two separate gates—the Shaffer Hydraulic Single Cellar Control Gate is suited. Even in sizes as large as 13⅜ inches (12 inches, Series 900) this gate is only 18½ inches high. Both gates have a simple method of changing rams. By unbolting a door in the side of the gate, the ram assembly can be pulled out and replaced with new rams. The assembly is then slid back into the gate, and the doors closed and bolted. Both Single and Double Gates have a completely enclosed design in which there are no exposed moving parts to become damaged or jammed; direct hydraulic drive with no secondary yokes or complicated linkages between hydraulic pistons and rams; and quick draining compartment bottoms that prevent sand and mud accumulations from gathering or interfering with free ram travel.

Circle No. 292 on Postcard, Page 303

SPACE NOW AVAILABLE

IN DOWNTOWN HOUSTON

Great Southern Building

Preston, Louisiana and Prairie Avenues

FOR LEASE

60,000 Sq. Ft. of office space on 4th, 5th, 6th, and 7th floors, now being used by Great Southern Life Insurance Company. Will be available March 1st, 1953.

Passenger and Freight Elevator Service and Steam Heat
Hot and Cold and Ice Water Furnished

15c PER SQUARE FOOT PER MONTH

Will lease one or more floors to tenant but will not subdivide floors.
All improvements and alterations to be at tenant's expense.

WILL AIR CONDITION

VARNER COMPANY, *Owner*
PRestan 1242

HAROLD JOHNSON, *Agent*
Houston, Texas

Locked Tripped Set Tripped

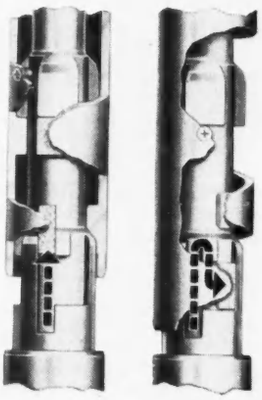
Shaffer-Waggener Bumper Safety Joint

Shaffer Jar Safety Joint

The Shaffer-Waggener Bumper Safety Joint combines a down-jar Bumper Sub with the protection of an integral Safety Joint. The tool is normally in the locked position while the drill string is being run into the hole or during drilling operations. However, should bridges be struck while running into the hole, or should a down blow be desired to loosen balled bits or reamers, it is only necessary to place additional weight on the drill string until the pre-set tripping weight is reached, whereupon a strong down blow is automatically struck. Additional blows can be struck repeatedly and continuously by simply raising and lowering the drill string. Each time the string is raised the tool automatically resets itself, and a blow is struck automatically each time the proper amount

of weight is placed on the drill string. As an additional protective feature, should it be impossible to loosen the stuck drill string by bumper action, it is only necessary to trip the tool, then rotate the drill string slightly in a reverse direction as it is lifted. This rotates the drive keys into unlocking slots (similar to a J tool), permitting the Safety Joint portion of the tool to be readily disconnected. In this manner, everything above the Bumper Safety Joint can be recovered from the well.

Circle No. 293 on Postcard, Page 303

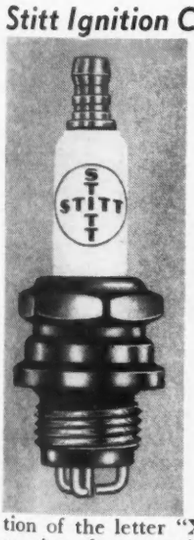


Method of Releasing Jar Safety Joint

The Shaffer Jar Safety Joint combines an up-jar action with the integral Safety Joint. In this tool the normal locked position is at the down end of the stroke and the blow is struck by raising the drill string. At the pre-set releasing point the accumulated tension in the string is automatically released, striking a sharp upward blow of the intensity for which the tool has been set. Lowering the drill string automatically resets the tool, and continued jarring action can be maintained as fast as the drill string can be raised and lowered. The Safety Joint feature in this tool is similar to that of the Bumper Safety Joint except that the tool is first unlocked by raising the drill string, then is rotated as it is slowly lowered until the drive keys rotate into unlocking slots. From this position, the string above the tool is recovered the same as the Bumper Safety Joint.

Circle No. 294 on Postcard, Page 303

Stitt Ignition Company



The "Aircraft" Industrial Spark Plug was designed especially for oil field use. Stitt "E" types, like the 17E multiple-ground gas engine spark plug, are available in a complete heat range in 7/8-inch thread and 18 millimeter thread sizes, for example the 8 ME. The same types, made especially for long service in the sour gas fields, are also available with special alloy electrodes that resist the sulfur in the fuel gas. These are designated by the addition of the letter "X" to the regular type number, for example 8MEX.

Circle No. 295 on Postcard, Page 303

C&S NEW Luxury CONSTELLATIONS

NOTHING FINER! NOTHING FASTER!

FLY C&S direct to

CHICAGO & SOUTHERN AIR LINES

VENEZUELA!

CUBA — JAMAICA

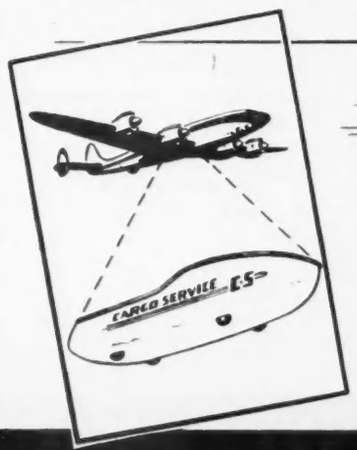
via

NEW ORLEANS GATEWAY

Flights each way Every day!

Fastest daily service from the Southwest! C&S new luxury Constellations offer 300-m.p.h. pressurized cabin service to the oil fields of Venezuela and South America through the New Orleans gateway. One carrier service from Houston, St. Louis, Chicago and Detroit, with connections at New Orleans to and from New York, Dallas, Tulsa, Los Angeles and San Francisco. For reservations call the nearest C&S ticket office or your Travel Agent.

C&S NEW LUXURY CONSTELLATIONS OFFER FASTEST SERVICE BETWEEN HOUSTON-CHICAGO; HOUSTON-DETROIT; NEW ORLEANS-DETROIT



SHIP

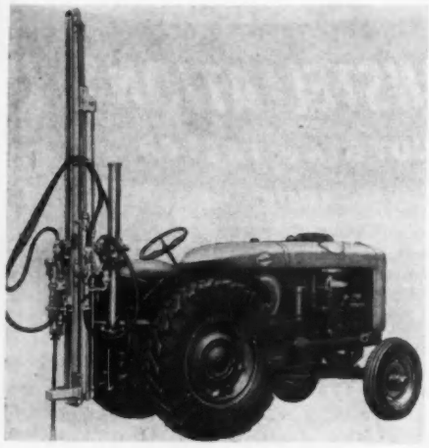
C·S SPEEDPAK

Large SPEEDPAK units, carrying as much as most two-engine cargo planes, are attached to the 300-mile-per-hour C&S CONSTELLATION . . . providing a lower deck exclusively for cargo. C&S is the *only* air line operating SPEEDPAK service to Cuba, Jamaica and Venezuela!

CHICAGO & SOUTHERN AIR LINES

OFFICES IN PRINCIPAL OIL CENTERS IN THE UNITED STATES

Schramm, Inc.



Pneumafeed

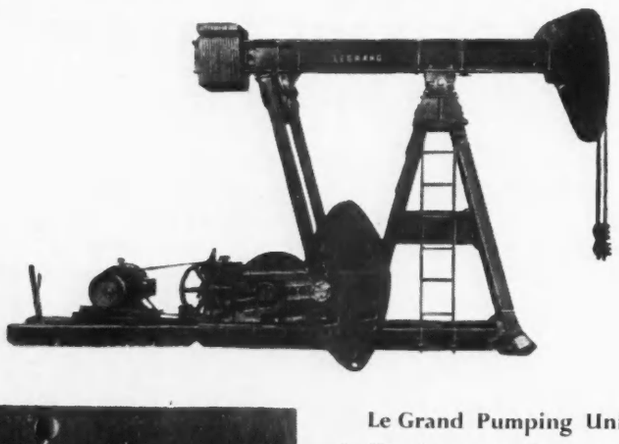
The Pneumafeed consists of a DR-45 Drifter and air feed mechanism of a WDE-45 Wagon Drill, mounted on a Pneumatractor, and has a travel of seven feet. The Pneumafeed can be used for drilling at any angle, vertically up and down, horizontally, or at any angle in between. It is mounted on an assembly consisting of a deck mounted on the transmission of a Pneumatractor, with a mounting post, right angle pipe clamp, safety clamp, 18 inches extension arm, saddle and line oiler. The drilling pressure is adjustable by the operator according to the material being drilled. The Pneumafeed when mounted on the Pneumatractor provides a self-propelled wagon drill complete with air supply.

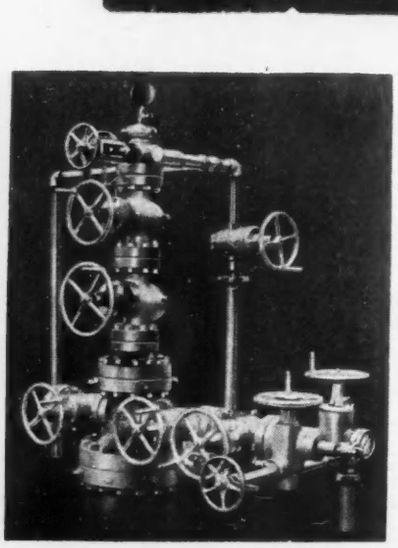
Circle No. 296 on Postcard, Page 303

LE GRAND

PRECISION BUILT

OILFIELD EQUIPMENT





Le Grand Pumping Units, precision built after extensive research, embody modern refinements in design and construction ensuring a field efficiency that gives constant production with low maintenance costs under the exacting conditions experienced in the World's oilfields.

Typical Le Grand O.C.T. casing head arrangement. The experience built into this equipment over the past 23 years results in economical and reliable field service.

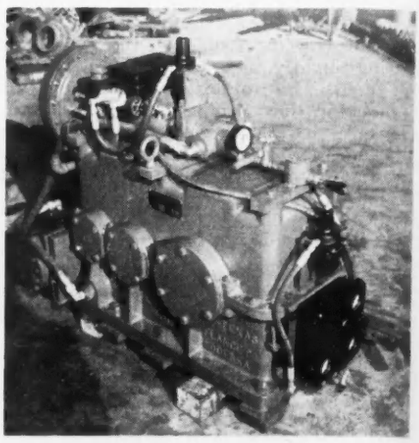
LE GRAND SUTCLIFF & GELL LTD

OILFIELD EQUIPMENT DIVISION

HORSTED AIRPORT, ROCHESTER, KENT, ENGLAND

Manufacturers of oilfield equipment including the products of Oil Center Tool Co., Houston, Texas, U.S.A. under licence

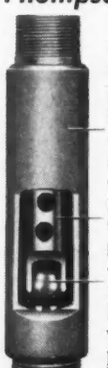
Texas Flange Company



Model 15 Holemaker is designed especially for use with Unit Rig U-15 drilling rig. It is mounted on top of the hoist near the driller's position and can be operated by the driller from his usual position. This device operates on a mechanical-hydraulic principle keeping a constant weight on the bit regardless of the formation. The clutch is arranged so that the Holemaker is automatically disengaged should driller neglect to do so when making a connection. Adjustment is obtained by a simple fingertip control easily accessible to the driller.

Circle No. 297 on Postcard, Page 303

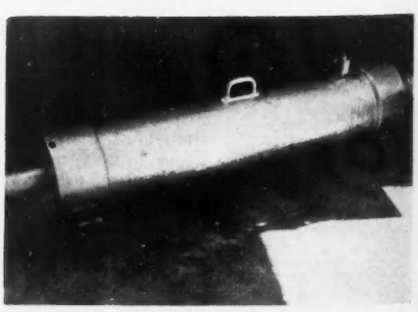
Thompson Pump Company



The New Thompson Ball Housing Cage, with stationary ball housing guide that completely encloses the ball, allows fluid to bypass ball thus eliminating fluid restriction. Ball spinning and chatter is also eliminated, preventing ball from beating out the cage. Center hole in ball housing guide places fluid load directly on top of ball, and ball is controlled by housing at all times. Fast opening and closing of valve solves many subsurface problems such as gas lock and bad sand conditions, according to the manufacturer.

Circle No. 298 on Postcard, Page 303

Texas Iron Works



The Flow-Thru Type Pump Chamber is a modification of the original TIW Pulsation Dampener which incorporated a blind flange on one end. The Flow-Thru type has 4½-inch outside diameter line pipe connections on each end with 5½-inch o.d. perforated mandrel through the vessel. This larger opening mandrel reduces the velocity of the flow which in turn facilitates the dampening effect. This unit may be mounted at any convenient location in

the mudline between the pump and the standpipe or between two pumps.

Circle No. 299 on Postcard, Page 303

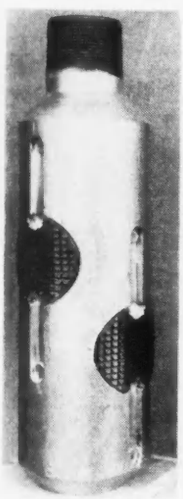
The New TIW Type HB Double Back Pressure Valve Set Shoe Assembly is similar to the TIW Type LS Set Shoe Assembly except that it has side ports which are closed while running liner into the hole. Circulation is obtained through ports in the bottom of the Set Shoe Assembly if necessary to clear obstructions in the path of the tool while running liner. When liner has reached setting position on bottom, the weight of the liner collapses the set shoe, opening the side ports.

Circle No. 300 on Postcard, Page 303

The Mudmaster has been augmented by an internal combustion engine, making it adaptable to all types of power and fuel usually found on a drilling rig. Previously, turbines were used on steam rigs and electric motors where sufficient power was available. Those units were mounted on the Mudmaster frame on an incline and drove the mixer shaft with V-belts. To use the internal combustion engine, which is not designed to operate on an incline, a right angle gear drive was developed. A small engine, diesel or gas, is sufficient to operate the unit.

Circle No. 301 on Postcard, Page 303

The Type H Packer Holddown is set by the same hydraulic pressure which is tending to push the packer up the hole. The tool may be run with any tubing to casing packer which is set by tubing weight. The pressure below the packer or in the tubing forces the piston type slip segments out against the casing wall during squeeze jobs or any other packer application where the pressure in the tubing is higher than in the casing annulus. As the tubing pressure is reduced either by swabbing or natural flow, the slips continue to hold until the pressures equalize. If the pressure in the annulus exceeds that in the tubing, the slips release entirely and allow the packer to set tighter.



Circle No. 302 on Postcard, Page 303

Are you getting these

Extra Dividends

from Red-Strand preformed wire rope?

● DO YOU KNOW that Hercules* Red-Strand preformed wire rope *consistently* lasts longer . . . speeds up operations . . . improves working conditions?

Does the preformed you use have the right degree of flexibility? Does it have absolutely correct strand clearances?

Are you getting preformed wire rope that is manufactured with the precise care . . . the exacting insistence upon *higher-than-rated* quality . . . and the specialized craftsmanship that goes into Hercules Red-Strand preformed wire rope?

Find out . . . it means money to you

Leschen wire rope specialists will help you answer these questions . . . to your profit. Ask them . . . before you place your next wire rope order.

Write for free copy of your "Use and Care of Leschen Wire Rope."

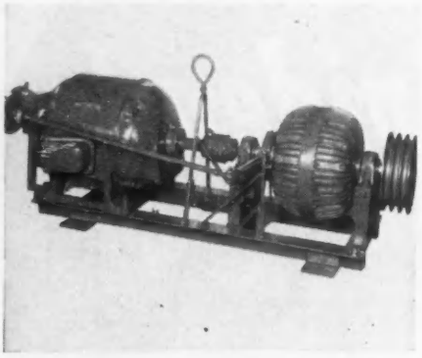
*Reg. U.S. Pat. Off.

A. Leschen & Sons Rope Co., St. Louis 12, Missouri

In business *only* to make wire rope — *better* wire rope — since 1857.

DISTRIBUTORS IN ALL PRINCIPAL CITIES

Thomas Hydraulic Speed Controls, Inc.



Model SRB-35 Thomas VariDraulic Drive affords infinitely variable speeds and shock load cushioning over a o/50 horsepower range, for driving mud pumps, core drilling machinery, strip well pumps and other oil field equipment. Independent engineering studies of a typical VariDraulic application on a stripper pump disclosed that the hydraulic cushion effect lowers the peak load, reduces the range of load on sucker rods and materially reduces the peak torque demand on the gear box. It also makes possible the selection of the best pumping speed for maximum efficiency from a given pumping installation; and the shock cushioning effect reduces maintenance and lengthens the life of the equipment. The drive is also applicable to other types of machinery.

Circle No. 303 on Postcard, Page 303

Taylor Instrument Companies

A New Dial Indicator can be used on instrument panels or individually mounted. It has a high-visibility six-inch dial with white graduations and numerals on a black background. Its white wedge-shaped pointer or indicator is provided with a micro-adjustment to permit accurate zero settings. The new stainless steel movement is designed to eliminate linkage errors. The die-cast aluminum case may be face- or flush-mounted, bottom or back connected. The bezel and case are cast with breech lock threads which are quick acting and require less than a quarter-inch turn to fully engage or separate. This locking device holds the glass tightly against the recessed rubber O-ring to provide an effective seal against moisture and fumes.

Circle No. 304 on Postcard, Page 303

Tube-Kote, Inc.

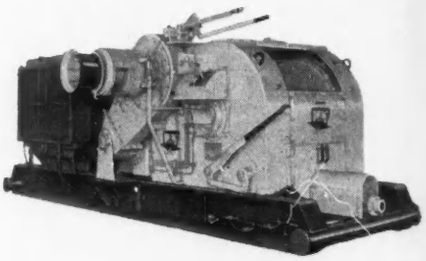
"TK-43" plastic is an extremely tough, flexible coating that is inert to most corrosive chemicals at normal temperatures. Due to its extra-thickness and rubbery nature it is particularly suited for services in which abrasion by suspended solids is encountered. "TK-43" is unaffected by scale and sour crude oils; most mineral acids such as hydrochloric and sulfuric; inorganic salt solutions; and concentrated alkalis. This plastic coating is baked on the inner surface of the pipe to form a dense, impervious film with low absorption and vapor-transmission rates.

Circle No. 305 on Postcard, Page 303

Teflon, a new thermo-setting plastic, is applied as a coating and baked on in such a way as to effect a thorough fusing of several layers with the metal surface of the object coated. The material can be used as an anti-sticking liner in piping, valves, fittings, etc. It is also used to prevent accumulation and build-up of calcium carbonate scales in flow lines and water-treating equipment.

Circle No. 306 on Postcard, Page 303

Unit Rig & Equipment Company



Unit Rig Model U-35 is designed to drill from 3000 to 5500 feet with 4½ inches drill pipe. It is a shallow to medium depth rig incorporating torque converter smoothness, and is designed for a maximum 400 input horsepower, using one or two engines. The U-35 is also deep well servicing unit, capable of handling rods and tubing of any rod pumped well. Basic design evolves around a torquè converter—reverse gear box—hydraulic actuated transmission unit and a propeller shaft rotary drive.

Circle No. 307 on Postcard, Page 303

THE BOWEN PUNCH-OUT CHAIN REPAIR TOOL
PROVIDES THE
Fast, Safe, Economical Way to Repair Chain

The Bowen Punch-Out Chain Repair Tool, for use in dismantling or repairing single roller chains, is simple and positively foolproof.

ELIMINATES THE DANGER OF STEEL SPLINTERS INJURING WORKMEN

CUTS DOWN REPAIR AND DISMANTLING TIME

PREVENTS DAMAGE TO CHAIN THAT RESULTS FROM SLEDGING

Bowen Punch-Out Chain Repair Tools are engineered to withstand severe use and are economically priced.

THE TIME SAVED ON ONE APPLICATION WILL OFFSET THE COST

OPERATION—Merely place the roller chain in the Body of the Bowen Punch-Out Chain Repair Tool as indicated in the illustration. Tighten the Screws—this automatically centers the pins of the tool on the pins of the chain. Strike the heads of the pins sharply with a hammer—this will drive the pins forward and quickly and safely force the pins of the chain through the links.

The Bowen Punch-Out Chain Repair Tool is available for A.S.A. Roller Chains in pitches from ½-inch to 3-inch sizes and for API Roller Chains in 3-, 3⅛- and 4-inch sizes.

For further information write the S. R. Bowen Company. Santa Fe Springs, California

AVAILABLE THROUGH LEADING SUPPLY STORES

SR BOWEN CO

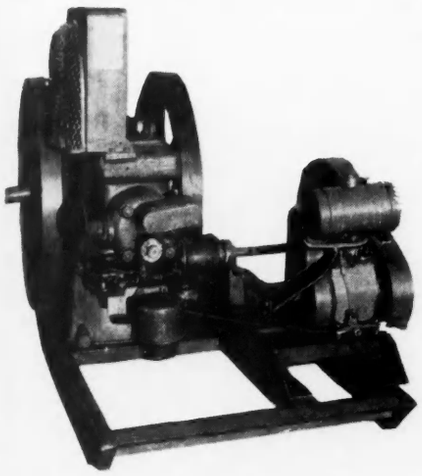
MAIN OFFICE AND PLANT:
11005 SOUTH NORWALK BOULEVARD
SANTA FE SPRINGS, CALIFORNIA
EXPORT OFFICE:
30 ROCKEFELLER PLAZA
NEW YORK CITY, NEW YORK
EXPORT REPRESENTATIVE: VAL R. WITTICH

BUILT ON SERVICE
1st
SINCE 1866

NATIONAL BANK *in Houston*

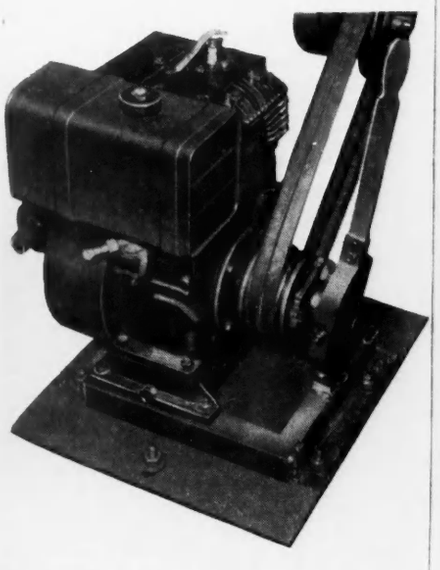
OIL & GAS LOANS
for Operators, Contractors & Suppliers
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

United Supply & Manufacturing Company



The United Multi-Cylinder Engine Starter provides continuous cranking power from easily started gasoline engine. This unit has a Bendix drive that operates off ring gear, and does away with batteries, generators and electric starters. Only one hand is required to operate the starter leaving the other hand free to adjust the engine. To install, the electric starting motor is removed and heavy-duty Bendix starter drive assembly is installed.

Circle No. 308 on Postcard, Page 303



The United Single-Cylinder Engine Starter gives positive pressure and continuous cranking power for starting single cylinder engines. This unit removes hazards of starting engines—it is foot operated leaving the operator's hands free. Positive power is obtained from the gasoline engine. Positive friction is controlled by operator to give extra power when needed. Sizes range from 5 to 90 horsepower.

Circle No. 309 on Postcard, Page 303

United States Safety Service Company

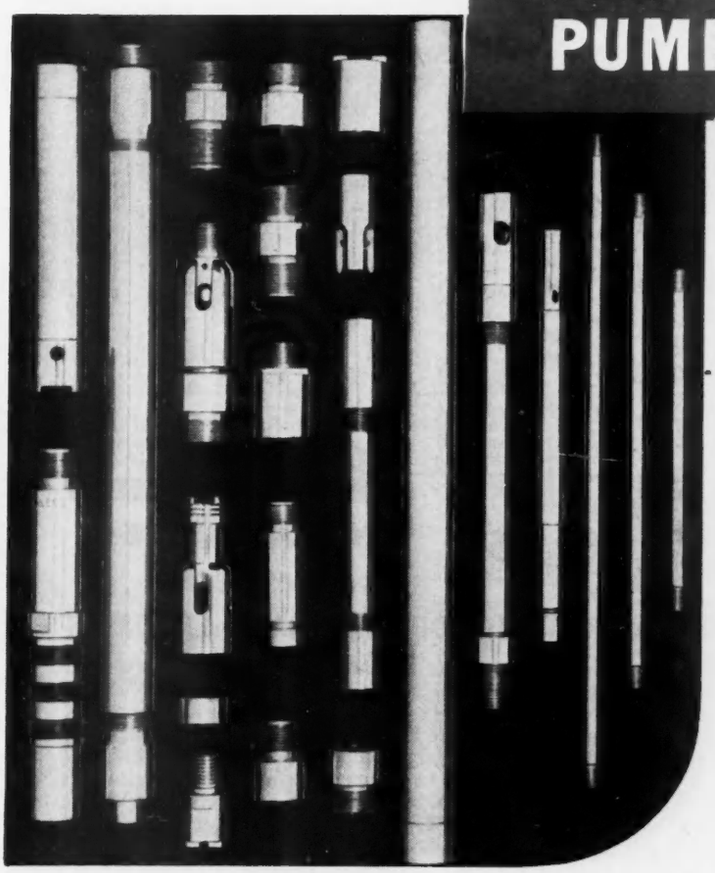
Duo-Chem Acid Safety Goggle has a vinyl frame of bright yellow, the ASA color code for acids, which affords quick visual identification of it as an acid goggle. Lens is also of vinyl optical plastic. The

WHAT IS *Interchangeability?*

NOAH WEBSTER SAYS: *"admitting of mutual substitution . . .*

Pacific Says: "conservation of critical materials and your dollars by reducing your inventory investment 30-35% by designing more than 15 major parts 'admitting of mutual substitution' in 6 different types of

PACIFIC *Precision Built* **OIL WELL PLUNGER PUMPS**



These Pacific Parts Will Assemble Six Different Types of Oil Well Plunger Pumps.

Pacific Moloy® sectional plungers are designed and finished so that when worn on the outside diameter they can be used as sectional liners without remachining.

Pacific plungers, ball valves, seats and cages, many bushings, adapters and fittings are interchangeable between types. Hold downs are interchangeable between types and between top and bottom.

Pacific Pumps inc.

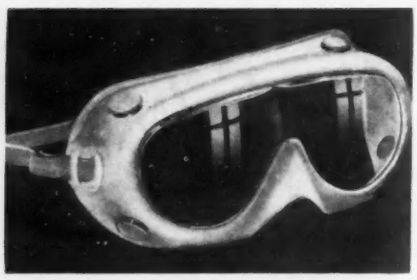
ONE OF THE DRESSER INDUSTRIES

HUNTINGTON PARK, CALIFORNIA

Export Office: Chanin Bldg., 122 E. 42nd St., New York — *Offices in all Principal Cities*

MID-CONTINENT DIVISION: 1221 E. 1st St., Tulsa, Oklahoma

DW-7 DISTRIBUTED IN CANADA BY: Lucey Export (Canada) Ltd., 1215 9th Ave., Calgary



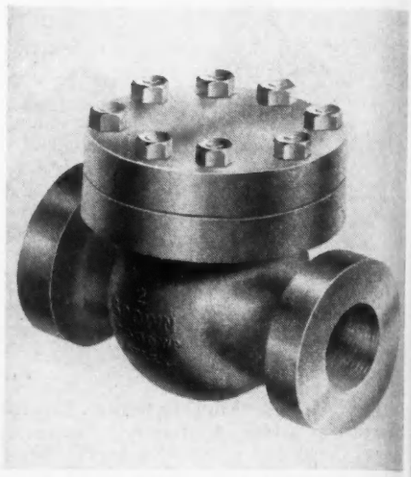
frame is soft enough to mold in a tight seal to facial contours and has a maximum resistance to acids and alkalis. Metal hoods over screen vents offer safe, adequate ventilation. The goggle will fit over personal glasses.

Circle No. 310 on Postcard, Page 303

The Halo Faceshield is made of lightweight Cellulose-Acetate-Butyrate materials. An all-green plastic spark protector affords wide-angle vision and still eliminates glare from overhead lighting. The visor lock locks the visor in the "up position" or the "working position," and eliminates the chance of the wearer adjusting the visor so it does not afford full protection. The Halo is available in three styles of headgear with clear or green visors and a special acid resistant visor for use around acids and chemicals.

Circle No. 311 on Postcard, Page 303

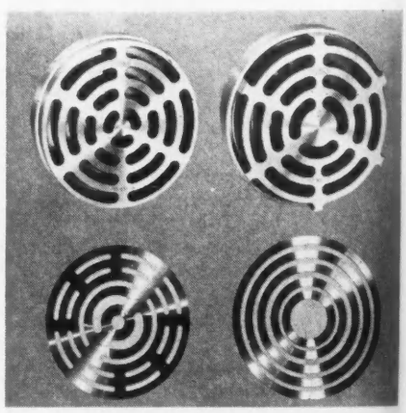
Vernon Tool Company, Brown Valve Division



A New Two-Inch, 2500-Pound Working Pressure cast steel screwed end check valve is specifically designed for high pressure applications in production, gathering and pipe line fields. This rugged but lightweight valve is also available with welding ends on special order.

Circle No. 312 on Postcard, Page 303

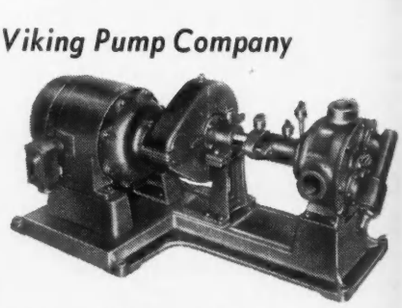
J. H. H. Voss Company



Valve Assemblies, to replace worn or inefficient valves in air, gas and ammonia compressors, are ground and machined to precise high-tolerance fit, of alloyed and stainless steels. The plates are dimensionally stable, withstand fatigue; will not chip, crack or score cylinder walls.

Circle No. 313 on Postcard, Page 303

Viking Pump Company



Series 162 Viking Pumps are totally enclosed units in capacities ranging from

This is a pretty battered looking instrument, and it should look badly worn, as it
ran 700 days while drilling 60,000 feet of hole.
About all that is left of the original tire is the hub, but according to the contracting firm of Hayes & Sprague, THE MARTIN-DECKER HYDRO-MECH TORQUE GAUGE functioned successfully throughout this entire run.
Indicating Gauge can be installed as an individual unit or as an integral part of other Martin-Decker controls

THE HYDRO-MECH TORQUE GAUGE
Indispensable for . . .
MILLING and CUTTING JOBS and DIAMOND CORING

Hayes & Sprague report that the Martin-Decker Hydro-Mech was an indispensable aid in diamond coring below 10,000 feet. Operators everywhere report phenomenal savings in time and equipment when milling, washing over, running diamond core heads, and directional and deep hole drilling with the Martin-Decker Hydro-Mech, because the gauge differentiates between the work required to overcome hole friction and that which is being done by the cutting tool so that the driller positively knows what his cutting tool is doing regardless of hole friction, rotational speed, etc.

Substantial increases in rotary chain life are being experienced by Hydro-Mech users, because of the cushioning provided by the synthetic rubber idler wheel and the reduction of chain vibration and whip.

ROTATABLE DIAL PERMITS GAUGE SETTING TO INDICATE NET-TORQUE-ON-BOTTOM

The gauge is designed with a rotatable dial, permitting the driller to "zero out" friction on drill pipe. This feature is especially valuable in assisting the driller on wells where friction from any cause tends to absorb weight during drilling operations. The torque built up by rotation before weight is applied to the bit is measured by the gauge, but is zeroed off by means of rotating the dial to zero; then as weight is applied, the work being done by the bit at the bottom of the hole is instantly reflected by increased readings above the zero reference point on the gauge.

HOME OF THE WEIGHT INDICATOR

Write for descriptive literature.

MARTIN DECKER CORP.
LONG BEACH, CALIFORNIA
SAN JOAQUIN VALLEY: T. J. CULLEN, BAKERSFIELD, CALIFORNIA
MID CONTINENT DISTRIBUTOR: REED ROLLER BIT COMPANY, HOUSTON, TEXAS
CANADIAN DISTRIBUTOR: REED ROLLER BIT COMPANY OF CANADA, LTD., CALGARY & EDMONTON, ALBERTA

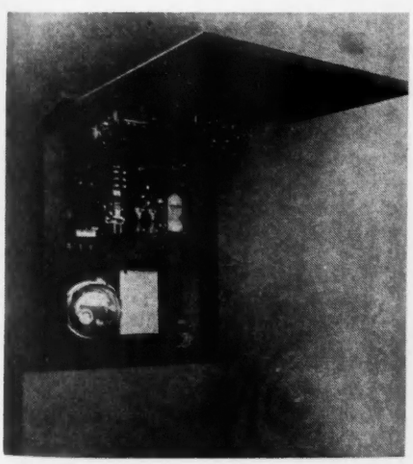
20 to 200 gallons per minute. All are of the positive suction type and are self-priming. The 162 pump has extra long stuffing box and are mounted on an L-shaped base with gearing enclosed in a cast iron guard and connected to totally enclosed 1750 speed motors. The unit is built so that it can be used outdoors without protection of any kind. It has stainless steel shaft, rustproof studs and nuts, and can be equipped with Viking relief valve on the pump head for added protection. Lubrication can be made either with grease cups or zerk fittings.

Circle No. 314 on Postcard, Page 303

Westinghouse Electric Corporation

Type CSP Motor for outdoor oil well pumping service is a three-phase, squirrel-cage, Life-Line induction type of weather-proof construction. Available in ratings of ½ to 15 horsepower (frames 224 through 326), the motor is of all-steel construction. It utilizes self-sealed, prelubricated ball bearings, and Tuffernell insulation with Tufvar wire for maximum dialectric strength with high flexibility.

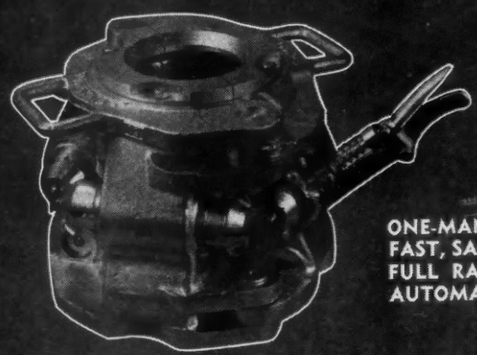
Circle No. 315 on Postcard, Page 303



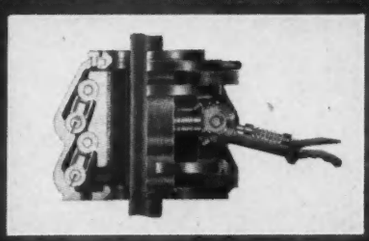
The Combination Life-Linestarter is designed for application with a single-speed squirrel-cage motor used in oil well pumping. It starts, stops and provides the motor with overload, low voltage, short-circuit and lightning protection. In NEMA sizes 1 through 4 as either a local control unit or automatic unit (time switch automatically controls motor for predetermined pumping periods during day), this new Combination Life-Linestarter is made in ratings up to 100 hp, 440-volt polyphase. New components include a Life-Linestarter; a 3-pole, 650-v lightning arrester; and a slamproof self-indicating handle.

Circle No. 316 on Postcard, Page 303

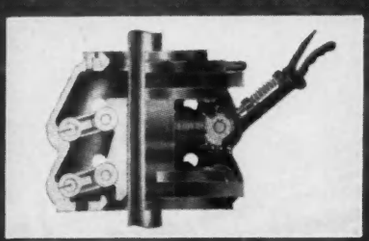
Increase Your Production Time
with the
KINZBACH
automatic tubing spider



ONE-MAN OPERATION
FAST, SAFE, POSITIVE GRIP
FULL RANGE
AUTOMATIC ALIGNMENT.



Running in. Slip segments are fully retracted



Slip Set. Note that slip segments are still parallel with the centerline of the pipe. Handle is locked in "closed" position.

This revolutionary development in Tubing Spiders, utilizes parallel-linkages to control the slip segments—a design which makes pipe handling faster and safer than ever before. The segments move at all times perfectly parallel with the tubing. The parallel slips provide a stronger grip than the conventional wedge design and will not gouge or score the tubing.

A single lever actuates the slips and they may be locked in either "open" or "closed" position. All segments are held in alignment with the tubing at all times and true radial closure is obtained.

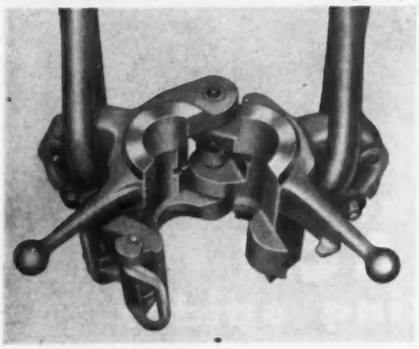
The assembly is hinged and may be placed around the tubing without breaking a joint and may be used on wellhead fittings or set in the rotary bushing.

For complete information write for Bulletin 23151.

KINZBACH TOOL CO INC

KINZBACH TOOL CO., INC.
P. O. Box 277 Houston 1, Texas
Export Office: 74 Trinity Place, New York, N. Y.

Web Wilson Oil Tools Company



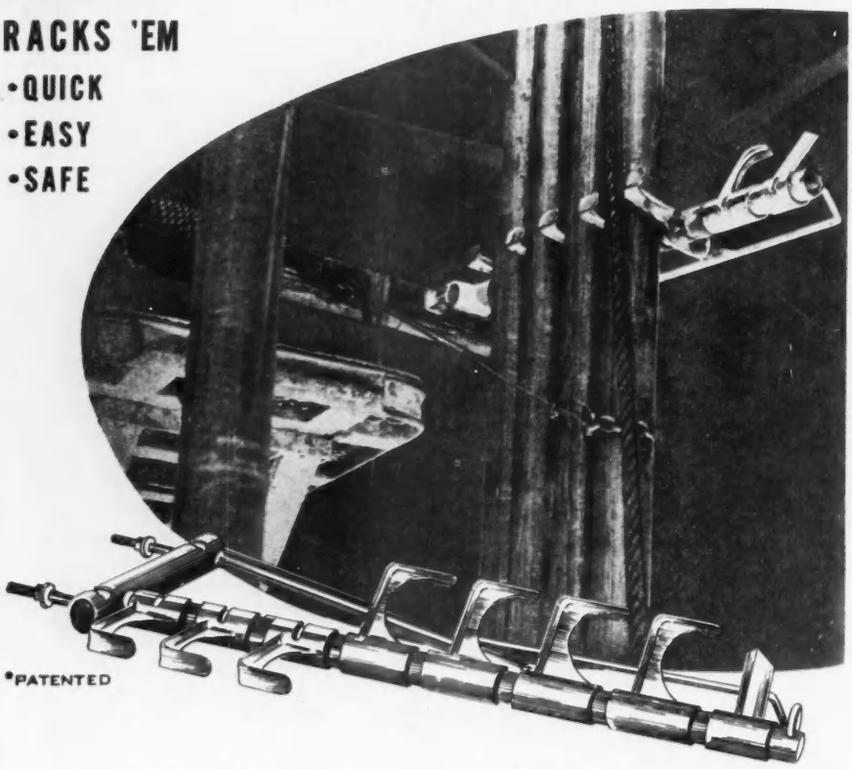
Web Wilson "Balanced" Center Latch Elevators are for use on collar type and "bottleneck" drill pipe. Operating advantages claimed include a slanting hinge pin which provides a self-closing feature, and also tends to minimize the load on the latch when the elevator is under strain. A coil spring on the main hinge pin causes the elevator to open immediately when unlatched, and forces the elevator off and away from the pipe; this self-closing spring also holds the elevator open against the closing force of the elevator links, making it unnecessary for the operator to force the elevator into an open and downward position, as with conventional elevators. Construction is from manganese-molybdenum steel, heat treated to produce maximum strength and hardness. All pipe contacting surfaces are flame hardened. The elevators are available in six capacities for loads for 25 to 300 tons.

Circle No. 317 on Postcard, Page 303

New S.I.W. DRILL COLLAR RACK*

FOR STANDARD RIGS

RACKS 'EM
- QUICK
- EASY
- SAFE



*PATENTED

Here is your answer to where and how to safely and quickly lock drill collars into standard rigs. Drill collars are moved in against bar and into individual locks flipped down into position as collars are added to rack. Rack fastens on hinge and can be raised and tied against derrick while drilling.
Standard rack accommodates seven stands of 6¼" drill collars.

When ordering or inquiring, specify:

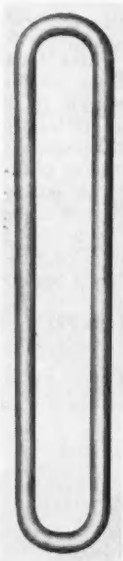
Number and size of drill collars to rack
Outside diameter of lift plugs.

SOLD DIRECT OR THRU SUPPLY STORES—WRITE FOR FULL DETAILS

SIW

SUNSHINE IRON WORKS

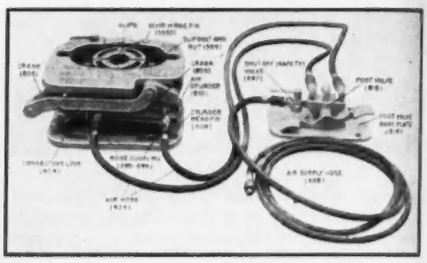
601 W. MURPHY ODESSA, TEXAS



Web Wilson "Magnaweld" Elevator Links are designed for use with tubing elevators and for all light weight service. They are made from selected steel, properly welded and then "magnafluxed" to ensure freedom from mechanical defects. The links are available in 1¼ x 30-inch size for 25-ton loads; and 1½ x 36-inch size for 30-ton loads. Capacities are based upon a safety factor of 4 to 1.

Circle No. 318 on Postcard, Page 303

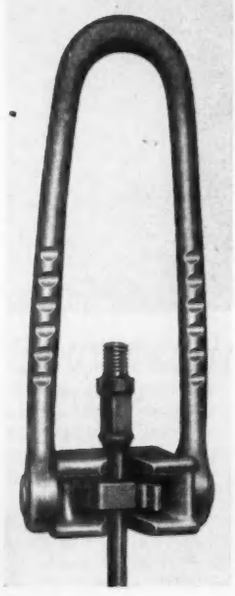
Web Wilson Power Tubing Spider is operated by air pressure from 50 to 125 pounds per square inch. It weighs only 225 pounds, and is easily handled by two men. A hinged door permits installation without lowering over tubing and a foot valve permits operation from any position on derrick floor, or from a location away from



the rig. Four connected slip jaws set simultaneously and do not damage tubing. The slip jaws are easily changed from one size to another. There is no danger of dropping tubing as slips are locked by air pressure in set position; they can be operated by hand if air supply fails. This spider is easily serviced on the derrick floor for replacement of worn parts.

Circle No. 319 on Postcard, Page 303

Web Wilson Sucker Rod Elevators are streamlined, with no protruding latches and are balanced to suspend the rod string vertically. Rod seats are accurately machined to exactly fit rods. Forged bail is reinforced at top. Elevators are instantly reversible to handle two rod sizes. The rod enters throat of elevator, is automatically locked in place, and can be released only when latch is operated. Latches can be operated from front or rear. Door of the elevator is spring loaded and if latch is not properly closed, the rod is ejected from throat of elevator and will not be picked up. The elevators are made for all popular rod sizes.



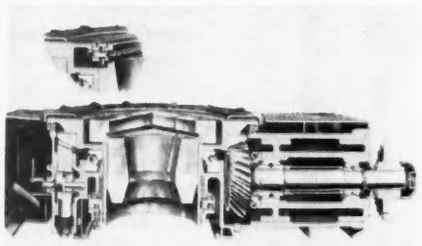
Circle No. 320 on Postcard, Page 303

Warren Automatic Tool Company

The New Remote Control Recorder of Rig-Runner puts an automatic drilling report with a full tour of chart in front of the driller. A driller coming on tour can check the previous driller's tour and can see in detail whatever operations occurred on that tour. The driller can get his own drilling report off the chart—circulating time, greasing up time, trip time, hole made, etc. With the Rig Runner chart in front of him the driller can drill at a pre-determined rate. He can also spot drilling breaks and can tell from the chart exactly how far he has drilled into the break. This new remote control recorder is connected by a flexible shaft to the indicator, which can be placed out of the driller's way. This new model Rig Runner develops the same type chart as the former Rig Runner. A fully automatic rate of penetration record is made, which indicates breaks in formation, distinguishes reaming from making new hole, shows time on and off the bottom. At all times and under all circumstances, the Rig Runner shows exactly how much footage is up on the kelly.

Circle No. 321 on Postcard, Page 303

The Wheland Company



A New Rotary has pressure grease lubricated cartridge type pinion assembly. The 17½-inch table is being manufactured in two standard API lengths—11- and 53¼-inch centers. These tables are adaptable to torque tube, chain or independently powered drive. Square sides with holds in each of the eight corners facilitate handling and rigging up.

Circle No. 322 on Postcard, Page 303

Why Good Pipe Fitters Choose RIDGID

4P Geared Pipe Threader

No. 4P, 2½" to 4" pipe

Extra easy to carry and put on pipe

★ Balanced loop handles—easy to swing 4P where you want it.

★ Mistake-proof workholder sets to size *before* put on pipe—only one set screw.

★ Practically no upkeep—drive pinion in oilless bronze bearing; safe enclosed gear.

★ 4 sets of 5 high-speed steel dies for 2½", 3", 3½", 4" pipe. Ratchet handle; RIDGID Universal Drive Shaft available. Also special 4P for conduit.

★ Buy efficient 4P at your Supply House.

THE RIDGE TOOL COMPANY • ELYRIA, OHIO

★★★ RIDGID Work-Saver Pipe Tools ★★★

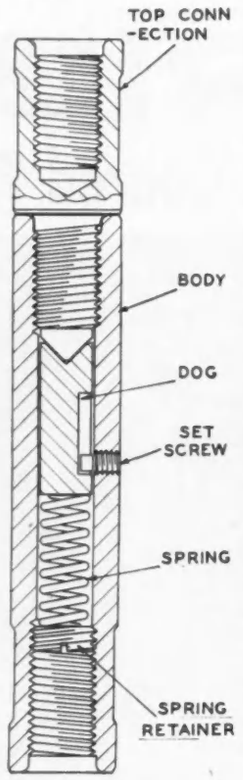
Wilson Foundry & Machine Company

The Nixon Hydraulic Tubing Anchor increases the effective length of the pumping stroke, at the working barrel, by eliminating "tubing stretch" in oil wells equipped with sucker rod type pumps. It also anchors tubing to casing thereby eliminating tubing collar wear, tubing wear, and casing wear. The Anchor is installed in the tubing string above the working barrel, or pump. As the well pumps up and fills the tubing, fluid pressure on the inside of the synthetic rubber sleeve forces the slips of the anchor out against the wall of the casing. This sets the tool and prevents tubing movement. To unseat the tool it is only necessary to equalize the fluid level in the tubing and casing. This may be done by pulling the standing valve with rods, or the equalizing port in the Anchor may be opened by rotating the tubing to the right, and pulling it up about eight inches.

Tests indicate the tool will more than hold the combined weight of the tubing string and the fluid column in the tubing. Hydraulic pressure of 5000 pounds per square inch has been applied to the inside of the anchor with no apparent extrusion of the synthetic rubber sleeve.

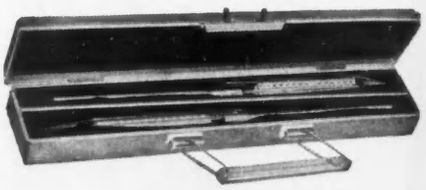
Circle No. 323 on Postcard, Page 303

The Wilson Sucker Rod Safety Joint is used to eliminate "rod stripping jobs" which are encountered when subsurface pumps are sanded up, or stuck due to other reasons. The Safety Joint is installed in the sucker rod string immediately above the pump. It is so designed that the top connection will back out of its box when the sucker rods are rotated to the left thereby making it possible to pull the entire string of rods before pulling tubing. The Safety Joint has a spring loaded dog which engages with the chisel point bottom of the top connection. When the top connection is made up all the way in its box, the spring loaded dog grips the chisel point and prevents it from turning under normal operation stresses. The shoulder on the top connection makes up against its box; however, it is not jammed similar to a regular sucker rod pin and box. When the sucker rods are rotated to the left, the chisel point turns on its right hand thread and forces the dog down against its spring. This allows the joint to unscrew. The Wilson Sucker Rod Safety Joint has no shear pins to replace. It can be used time after time without the replacement of any parts.

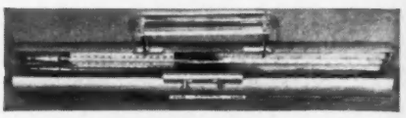


Circle No. 324 on Postcard, Page 303

W. L. Walker Company



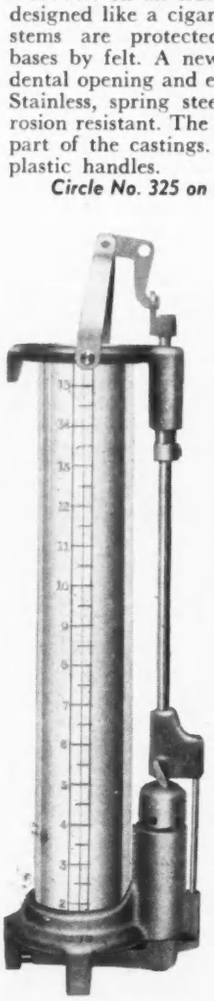
Dual Hydrometer Case.



Triple Hydrometer Case.

The Walker Dual Hydrometer Case is of rectangular shape and lined with thick wool felt on all sides. The Triple Case is designed like a cigar case and hydrometer stems are protected by sheepskin, the bases by felt. A new latch prevents accidental opening and eliminates use of wires. Stainless, spring steel latch pins are corrosion resistant. The hinges are an integral part of the castings. The cases have vinyl plastic handles.

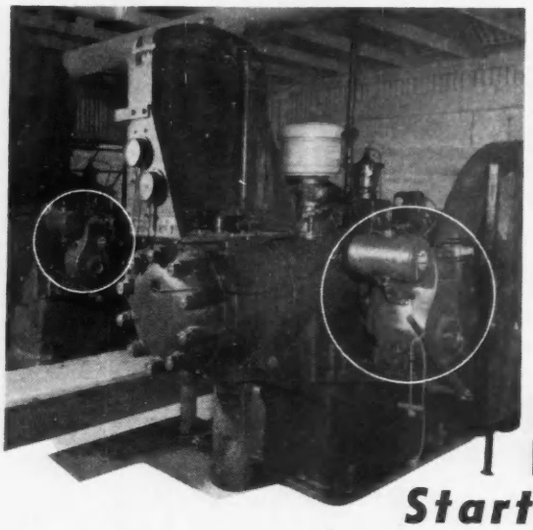
Circle No. 325 on Postcard, Page 303



The Walker Tulsa Oil Thief has been developed to facilitate sampling of crude oil. The thief is constructed entirely of brass tubing and bronze casting to be spark-proof and durable. It is a single trip device with a rotating valve seat to insure proper seating. Encased springs prevent fouling and a flat bail prevents chain or rope fouling. A trip mechanism accommodates any length trip rod. The Walker Tulsa Oil Thief is available in fives izes: 12, 16, 18, 24 and 36 inches.

Circle No. 326 on Postcard, Page 303

Walker Centrifuge Machine is a compact, six-volt centrifuge machine for use by the field gauger. It measures accurately the BS and water content of crude oil. The new Walker Centrifuge has combined



POWER TO FIT THE MACHINE

POWER TO FIT THE JOB

WISCONSIN-POWERED Starting Units!

Dependability for these gas booster units begins with the first spin of the flywheels of their starting engines. That's when the two Wisconsin Heavy-Duty Air-Cooled Engines begin delivering dependability.

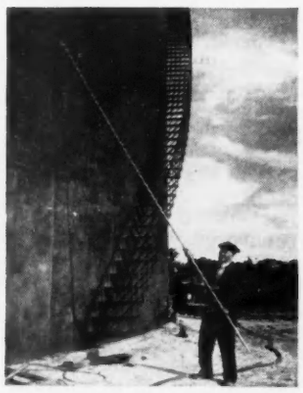
Here's no example of "hit or miss" preference. Booster station operators, like the majority in the oil fields, choose Wisconsin Engines above all others, 3 to 30 hp., for the stamina they deliver. For example, both ends of every crankshaft ride on tapered roller bearings, preventing bearing failure. Also, you can put a Wisconsin to work, summer or winter, far from constant attention, and know the work will be done. *Plus performance* is the "pay off" due to such features as fool-proof air-cooling and an easily-serviced OUTSIDE magneto with impulse coupling for quick starts and steady running. No other unit, 3 to 30 hp., offers you as much. 4-cycle single-cylinder, 2-cylinder and V-type 4-cylinder models.

WISCONSIN MOTOR Corporation
MILWAUKEE 46, WISCONSIN
World's Largest Builders of Heavy-Duty Air-Cooled Engines

WRITE TO HARLEY SALES CO.
619 S. MAIN STREET, TULSA, OKLAHOMA
M & M BUILDING, HOUSTON, TEXAS
505 SOUTH MAIN ST., WICHITA, KANSAS
OIL FIELD DISTRIBUTORS FOR WISCONSIN ENGINES AND ALL TYPES OF UTILITY UNITS.

rheostat and switch with safety pilot light. Speeds are adjustable up to 2450 rpm (required ASTM speed—1750 rpm). Six volts and 5½ amps make it easy on the car battery. Being constructed of aluminum castings makes it light and non-sparking. The tube head is numbered to aid ready identification of samples. A direct drive to the tube head eliminates unnecessary bearings which before were subject to dirt.

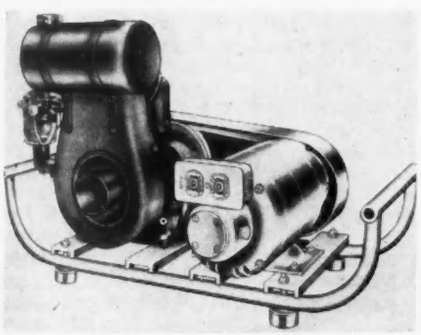
Circle No. 327 on Postcard, Page 303



The Walker Strapping Pole enables the tank strapper to scribe the tank and string the strapping line on any size tank from the ground. Its head has a button to hold the strapping line ring so it may be carried around the tank. The line can then be placed in the open link and the strapper walks around the tank guiding the strapping line on to the scoring marks. Two aluminum fingers adjust the line upward or downward exactly to the scribing marks. There are two holders on the pole. One holds a brass guide, the other chalk. These enable the strapper to set off the distance from the tank seams and scribe the tank from the ground. In five, four-foot sections, the pole is easy to carry in the car.

Circle No. 328 on Postcard, Page 303

Wincharger Corporation



Model 1800 Electric Generators are portable, gas-engine driven types in three general ratings—1000, 1250, and 1350 watts at 115 volts, 60 cycles, alternating current. They have sealed ball bearings and it is claimed that the belted construction cushions shock to the generator, reduces vibration and increases the generator life. The generator is mounted alongside the engine out of the path of hot air from the engine cooling system. The unit has a universal mounting base which permits mounting any one of several makes of engines.

Circle No. 329 on Postcard, Page 303

After the POLICY, What?

Do you get all these when you buy a Workmen's Compensation Insurance Policy in Texas?

1. Direct branch office claim service that assures prompt, efficient handling of all claims and return of the injured worker to his job as quickly as possible.

2. Safety Engineering Service that helps you reduce accidents, conserve needed manpower and reduce compensation costs.

3. A plan of providing Insurance that saves you money and returns those savings direct to you.

You get these when you buy your Insurance from Texas' largest writer of Workmen's Compensation Insurance. Over thirty-two million dollars saved and returned to Texas policyholders to date. Call or write for full information now.

22 SERVICE OFFICES IN TEXAS

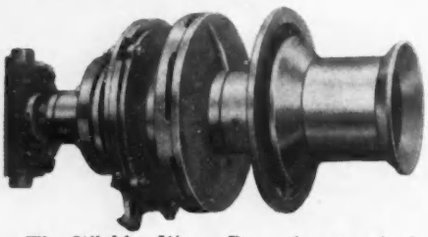
ABILENE • AMARILLO • AUSTIN • BEAUMONT
CORPUS CHRISTI • DALLAS • EL PASO • FORT WORTH • FREEPORT • GALVESTON • HARLINGEN
HOUSTON • LUBBOCK • LUFKIN • MIDLAND
PORT ARTHUR • SAN ANGELO • SAN ANTONIO
SHERMAN • TYLER • WACO • WICHITA FALLS

TEXAS EMPLOYERS INSURANCE ASSOCIATION
HOME OFFICE · DALLAS, TEXAS

HOMER R. MITCHELL, *Chairman of the Board* A. F. ALLEN, *President*

The Association writes Workmen's Compensation Insurance only. Fire, Automobile and other Casualty Insurance are available through a companion company, the EMPLOYERS CASUALTY COMPANY.

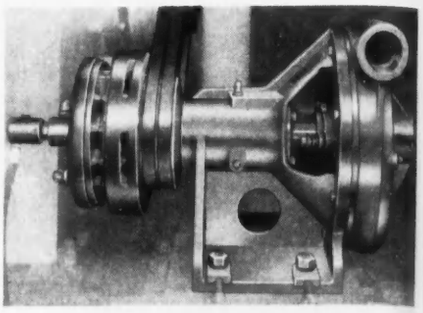
Wichita Falls Foundry & Machine Company, Inc.



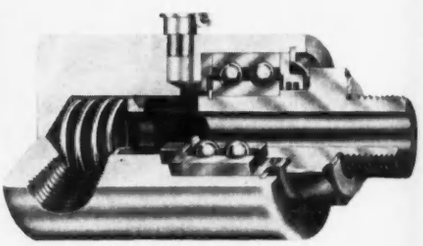
The Wichita Water Pump is a two-inch centrifugal enclosed impeller type with a shaft larger than those in conventional pumps and covered with a thick layer of stainless steel under the packing gland. Packing is of the chevron type which seals with little pressure, and the gland is automatically adjusted by two springs which supply correct pressure to keep the packing tight under normal conditions. Large ball bearings are used. Suction pipe is 2½-inch and discharge pipe is two-inch. Capacity at 30 pounds is 250 gallons per minute at 1800 revolutions per minute. Pump can be furnished with shaft extension for direct motor drive, or with V-belt pulley keyed to shaft. It is also available with either mechanical friction clutch or an Air-Tube disc clutch.

Circle No. 330 on Postcard, Page 303

The Wichita Air-Tube Cathead embodies the qualities of the air-tube disc clutch, and is claimed to make up all joints exactly alike. The cathead is capable of pulling all the line will safely stand without breaking, and will not break the line unless such action is desired. The same cathead can be used for either spinning or breakout out, and all parts are interchangeable. Used with a new, quick-fastening line connection and a brake, this cathead can be used with a wire line as a hoist to drag in joints of pipe, pick up heavy loads, etc. instead of using manila rope on the spool cathead. Neoprene and rayon air tube as well as friction lining, can be replaced without taking the cathead apart.



Circle No. 331 on Postcard, Page 303



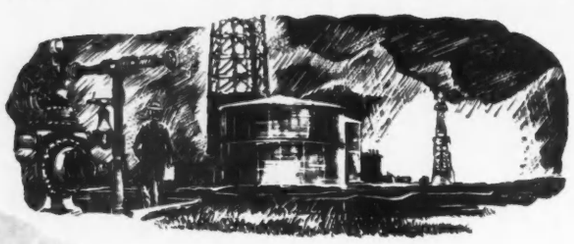
The Wichita Roto-Coupling is a device to connect, or couple, a non-rotating air, gas or fluid line to a rotating shaft. All oil which goes into the ball bearing and to the lapped sealing surface is filtered through a felt ring. This prevents grift or other foreign substance from getting into the bearing or onto the sealing surface. The O-ring seal is mounted so that it not only seals off air but permits the carbon ring to move freely forward as wear occurs. The felt ring holds a considerable quantity of oil and since it is in contact with the sealing surface it will keep this surface lubricated. A wide copper sealing gasket insures true running joint with shaft, and a tight joint.

Circle No. 332 on Postcard, Page 303

The Wichita Springless Quick Release Valve will close and seal with less than ten pounds pressure where other valves require between 25 and 30 pounds pressure, the manufacturer states. In tests, the valve made hundreds of thousands of engagements and disengagements without evidence of wear. The valve has an O-ring seal that can be replaced quickly without using special tools. It is made in half-inch pipe size only, with inlet to fit #10 high pressure hose fitting.

Circle No. 333 on Postcard, Page 303

ASK THE ROYAL ABOUT CANADA'S OIL



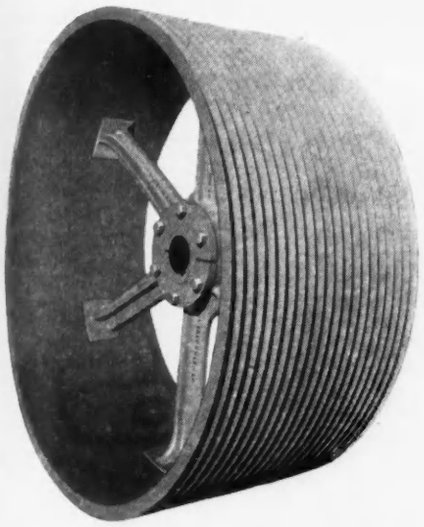
Branches throughout Canada's oil-rich western plains. On-the-spot information available through J. C. Mayne, Supervisor, Calgary, Alberta, or Head Office, Montreal

We do not provide information on oil securities

Assets exceed $2,500,000,000

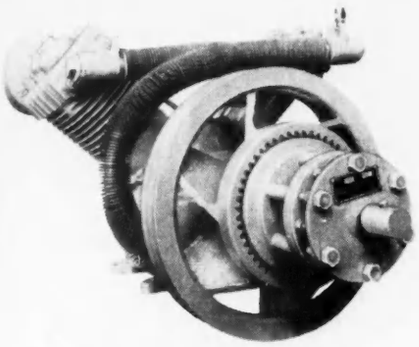
THE ROYAL BANK OF CANADA

Over 760 branches in Canada and abroad



Wichita V-Belt Pulleys are available in any size up to 70-inch pitch diameter and 36-inch face, for any standard belt size. The Wichita Improved Split Type Removable Tapered Hub has a long, firm grip on the shaft and is firmly bolted to both sides of the pulley hub. This provides rigidity and strength of a solid hub with easier removal from shaft and change of bore.

Circle No. 334 on Postcard, Page 303



The Wichita Air Compressor Clutch has strong springs which provide simple, positive engagement to start the compressor at any desired minimum pressure without requiring the operator's attention. Air pressure acts on a diaphragm to disengage clutch when maximum pressure is reached. The maximum and minimum pressure is set on a pilot valve which quickly turns on the air to the clutch or releases it so that the clutch is either fully engaged or completely released. The clutch has a lining which wears to a full quarter-inch before replacement is necessary. One clutch size is for use on compressors requiring approximately 5 horsepower input at 700 revolutions per minute and having a capacity of around 25 cubic feet of free air. This compressor has a 16-inch diameter, two-groove, C-section pulley and an eight-inch diameter clutch. The other available clutch has a 26-inch diameter pulley with two or three C-section grooves and an 11-inch diameter clutch.

Circle No. 335 on Postcard, Page 303

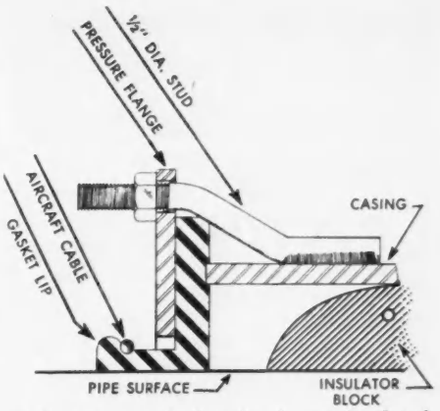
Bill White Bit Company

The Tungsten Insert Geophysical Bit is a fast drilling shot-hole bit. Its body is made of alloy steel and each finger contains a tungsten slug set with hard metal. Short water courses are provided to prevent plugging. Extra long reaming edges are built in clean holes. The entire body is heat treated for maximum wear. With proper subs it will make up to any size connection.

Circle No. 336 on Postcard, Page 303

T. D. Williamson, Inc.

Type "L" WmSeal Casing Bushing butts against the end of casing instead of fitting inside the casing, and is insulated from the carrier pipe. It is easily installed in the field under adverse conditions. Because of its design and construction, the Type "L" bushing can be installed on out-of-round casing, where there is a wide variation in casing wall and coating thickness, in mud, and where there is a narrow space between pipe and casing. The pressure flange is held tightly against the gasket seal on the casing by half-inch studs welded to the casing. Galvanized aircraft cable is tightened around the gasket lip



to insure a seal that is always insulated from the pipe line.

Circle No. 337 on Postcard, Page 303

SAVE

✓ LABOR
✓ EQUIPMENT
✓ DOWN TIME

With J—F DYNAMOMETER

Take guesswork out of your pumping operations. Let vital, concrete facts guide your decisions. Use a J-F Dynamometer, the *simple-to-operate* instrument used on pumping wells for *operational control.*

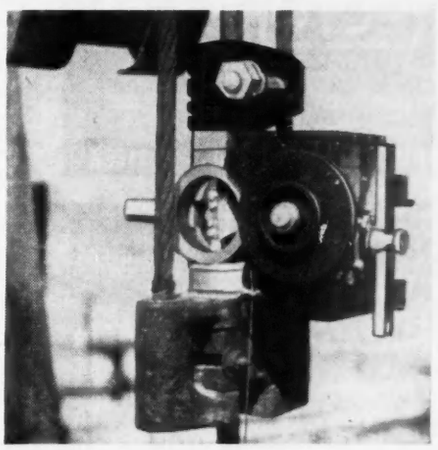
SIMPLE

•

ACCURATE

•

EASY TO OPERATE



Here's How You Can Cut Burdensome Operating Costs!

MARGINAL WELLS
Lifting costs can be *reduced* by closer control and adjustment of mechanical equipment. In one area alone, 25 wells were transferred from red to black by *operational control* with J-F Dynamometer.

PULLING OF "GREEN PUMPS"
Unnecessary pulling of pumps results in extra labor, material costs and down time. The operations of your pumps may be checked at the surface in a few minutes with a J-F Dynamometer. The test is simple and can be made by the foreman, head roustabout or other personnel.

EQUIPMENT SIZING AND SELECTION
Based on **facts,** accumulated dynamometer information is extremely useful in selection and installation of proper design and size of equipment.

COUNTERBALANCING
About 80% of all wells checked for counterbalance are found to be out of balance in varying degrees. The J-F Dynamometer measures the counterbalance effect at the polished rod. This enables accurate adjustment for normal pumping operation.

SUCKER RODS
Sucker rod failures are caused by load. The J-F Dynamometer records the load of every point in the stroke so that detailed analysis can be made and corrective measures taken.

SIMPLICITY OF OPERATION
The simplicity of operation of the J-F Dynamometer has greatly widened its use for **operational control.** For example, inexperienced personnel, after one day's instruction, can operate the instrument.

JOHNSON-FAGG
Engineering Company

3920 South Peoria **Tulsa, Oklahoma**

Be sure the connections
ARE LEAK PROOF!

Make them up with RECTORSEAL!

• You'll never have to worry about connection leaks on Fuel, Water and Air Lines; Tubing and Casing connections when you make them up with RECTORSEAL. Apply Rectorseal directly from the container. It sets-up quickly to a plastic elasticity that positively seals the connection . . . and keeps it sealed until broken-out.

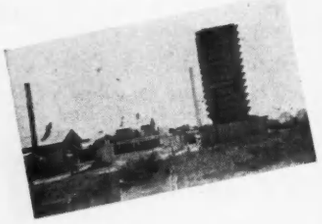
Ask for Rectorseal by name at your Supply Store. If they can't supply you, write **RECTORSEAL, Dept. G**
2215 Commerce St., Houston 2, Texas

RECTORSEAL
Manufactured by
RECTOR WELL EQUIPMENT CO., INC.
Fort Worth, Texas
MAKING THE OIL INDUSTRY SAFER

SECONDARY MODERN RECOVERY
TECHNICAL CONSULTING
PRODUCTION ENGINEERING
SERVICE, INCLUDING
CORE ANALYSIS

PRESSURE MAINTENANCE WITH GAS OR WATER

Pressure Maintenance and Gasoline Extraction Plant



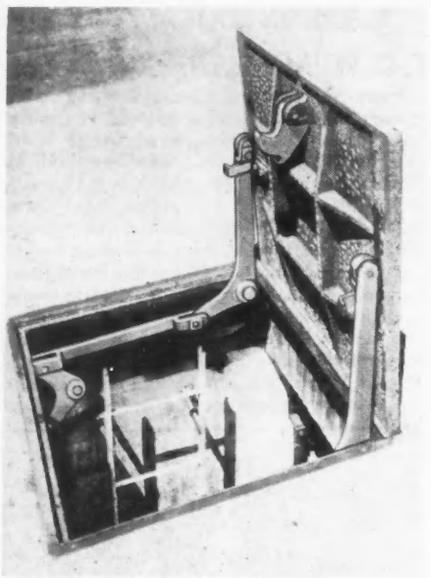
Jack County, Texas

REPRESSURING WITH GAS OR WATER

SURVEYS
ESTIMATES
DESIGN
INSTALLATION
SUPERVISION

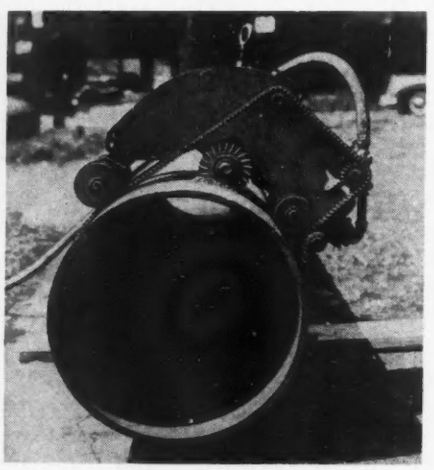
PETROLEUM ENGINEERS
CABLE & STAPLES
WICHITA FALLS, TEXAS

The E. H. Wachs Company



The Wachs Safety Counterbalanced Vault Cover is opened by inserting a combination key-handle and giving it a half turn. Lifting the cover to its vertical open position is a one-handed job because counterweights, which also hold the cover in a protective upright position, ease the load. The cover cannot slam or drop into the vault, and the counterbalance structure protrudes less than six inches from wall. Heavy duty cast iron frame and ribbed steel cover are machined for accurate rattleproof fit.

Circle No. 338 on Postcard, Page 303



A New Air-Powered Pipe Saw cuts cast iron or steel pipe from 12 to 48 inches in diameter at the rate of 2 inches per minute. The machine uses a High Speed Steel milling cutter which leaves clean cut milled edges and requires only 85 pounds of air pressure for operation. Changes in adjustment for different pipe sizes are made by merely setting guide rollers and altering the two travel-chain lengths. The Wachs National Pipe Saw is strapped tight to the pipe by two silent type chains that act as a flexible ring gear for positive feed and automatically compensate for pipe swells and irregularities. As it cuts, it travels around the pipe making the cut in one complete rotation. The Wachs Pipe Saw is portable, weighing 265 pounds, and can be handled and set up by two men in about 15 minutes.

Circle No. 339 on Postcard, Page 303

Wilson Supply Company

The Wilson "Double-Displacement" Pump is a rod type, traveling barrel unit—run in a well on the sucker rods. In operation the barrel tubes move with the sucker rods, while the plungers are stationary. The pump is made up of two separate barrel tubes, one mounted above the other. The barrel tubes are connected by a packing box which reciprocates with them on each stroke of the pump. The packing box seals off on a polished plunger tube which extends between the upper and lower plungers. On each up-stroke of the pump, two separate chambers are filled with fluid, whereas with a conventional pump only one chamber fills on the up-stroke. On the down-stroke fluid is discharged from other chamber. Barrel tubes are furnished from either heat-treated seamless steel stock, or hard chrome plated seamless steel stock. Plunger assemblies are furnished dressed with the Wilson "No-Friction" Pump Cups, conventional lip-type pump cups, or standard composition type rings.

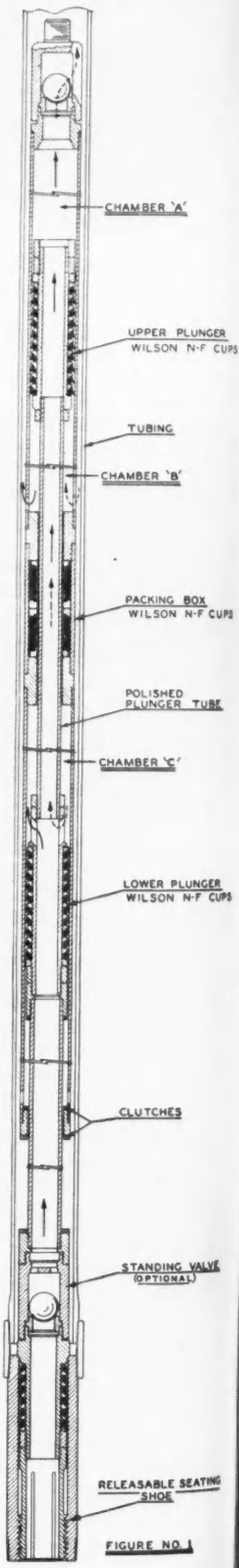
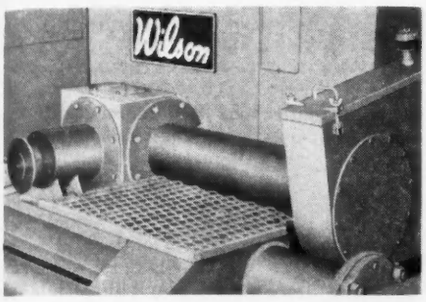


FIGURE NO. 1

Cup-Plunger assemblies are recommended by the manufacturer for clean, fluid wells, and composition ring type plungers are recommended for either clean wells or producing sand laden fluid.

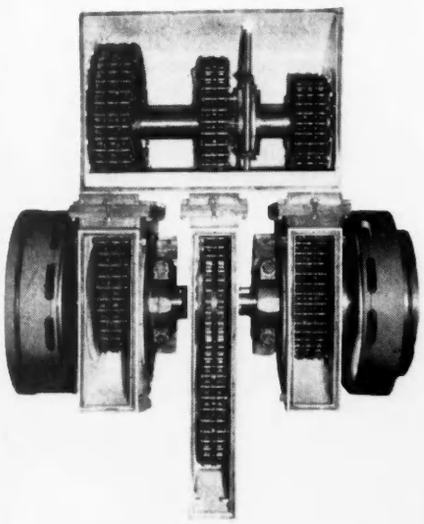
Circle No. 340 on Postcard, Page 303

Wilson Manufacturing Company, Inc.



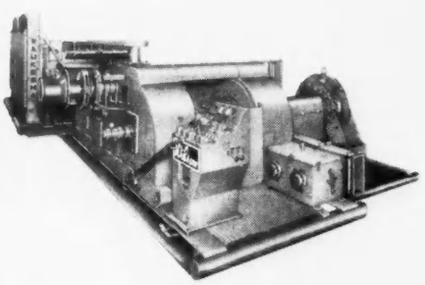
Propeller Shaft Drive to Rotary Table is now available on Wilson rigs as optional equipment. The new simple, compact Wilson drive replaces the more frequently used chain drive to rotary table.

Circle No. 341 on Postcard, Page 303



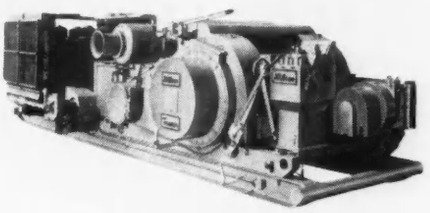
The Wilson Air-Tube Friction Clutch Chain Drive Transmission is used on the Torcair, and Roadair type, Giant, Atlas, Titan, and Super Titan 66 rigs. It is entirely air operated, and uses the Wichita Air-Tube Disc Clutch. This transmission provides two speeds forward and one reverse, with an instant air panel control available. Depending on the size of the rig, the clutches used are more than adequate to transmit the power to the drum or the rotary table drive.

Circle No. 342 on Postcard, Page 303



The new Wilson Atlas Rig, designed with large drum, large brakes and large drum clutches is a rig in the 10,000-feet class. The Atlas has 46 x 10½-inch brake rings; 24 x 40-inch barrel; full vision air panel control; Air-Tube disc clutches on all drives; new two-speed friction clutch transmission with Air-Tube disc clutches; four speeds to rotary table; new Air-Tube disc clutch on water pump drive controlled from driller's control panel; new sectional box-type compound, so that each engine and compound section can be moved in one unit without danger of engine getting out of line with compound; and new Auxiliary Accessory drive built into compound.

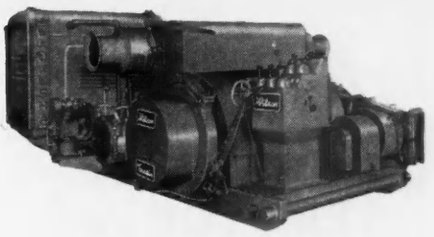
Circle No. 343 on Postcard, Page 303



Wilson Mogul Torcair "46" Rig is a small rig which embodies these claimed advantages: 46-inch brake rings; Allison three-speed forward; one reverse Torqmatic Transmission, Parkersburg 15-inch double Hydrotarder. Wichita Air-Tube Disc Clutches are used throughout this rig as on all other Wilson rigs. The Mogul "46" is rated for drilling to 5000 feet with 4½ inch drill pipe.

Circle No. 344 on Postcard, Page 303

Wilson Mogul Torcair Single Drum Rig has been designed to meet the need for a torque converter type rig suitable



for drilling up to 4000 feet with 4½ inch drill pipe. The most important feature, according to the manufacturer, is the use of Wichita Air-Tube Disc Clutches on high and low speed drum drive and on rotary drive. The low speed drum clutch has approximately 75 percent greater torque capacity than the radial type.

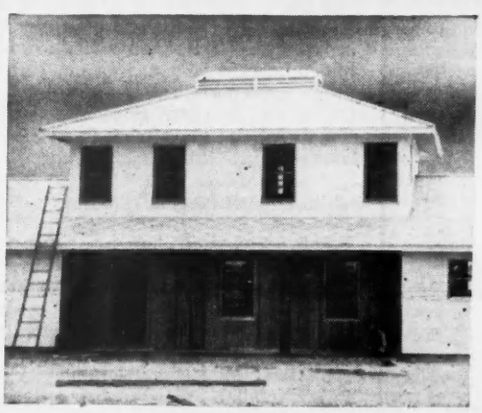
Circle No. 345 on Postcard, Page 303

Wilkening Manufacturing Company

Pedrick DO8 Type conformable piston rings for large cyclinders have two thinner-section cast iron sections in the groove, providing axial conformability as well as radial conformability. Instead of the humped steel expander commonly used to furnish the pressure required, the new ring has a new peripheral-abuttment type Equalizer which does not contact the bottom of the groove. The Equalizer provides uniform pressures around the entire circumference of the ring, with no low or high pressure spots. It is completely "open," to allow for oil drainage.

Circle No. 346 on Postcard, Page 303

CASE HISTORIES
of Houston Ready-Cut Installations



Pan American Production Co.'s Office Building at Snyder, Texas—When Pan Am ordered a field building for the Snyder area from which they could direct their oil operations, Houston Ready-Cut House Co. accepted the job—built a sturdy, comfortable and efficient building calculated to give years of service. This building typifies the versatility of Houston Ready-Cut's manufacturing and erection services and their ability to handle any size housing job.

IMMEDIATE DELIVERY
anywhere in the world

What are YOUR Needs?

★ 1 HOUSE OR 100
★ INDIVIDUAL UNITS, OFFICE BUILDINGS OR DORMITORIES
★ ERECTED COMPLETE OR FOR ERECTION BY YOUR CREWS

FREE SURVEY - phone or wire for a personal survey and estimate *without obligation.*

HOUSTON Ready-Cut HOUSE CO., Inc.
Prefabricated Housing for Industry Since 1917
P. O. BOX 124 HOUSTON 1, TEXAS

Yes sir!

24 HOUR SERVICE

on

QUALITY Petroleum Products

for the oil fields!

Just check this list of warehouses below and you'll see why we say — "WE'RE AS NEAR AS YOUR PHONE"! *Call us collect and see!*

Branch Warehouses

TEXAS
Odessa, Robert Lee, Snyder, Corpus Christi, Palestine and Winnsboro, Texas.

LOUISIANA
Houma, Eunice, Monroe, Ruston and New Orleans, La.

MISSISSIPPI
Brookhaven and Natchez, Miss.

UTAH
Vernal, Utah

WYOMING
Casper and Worland, Wyo.

COLORADO
Artesia, Colorado

NEW MEXICO
Lovington, New Mexico

NORTH DAKOTA
Williston, North Dakota

Distributors of Quality Petroleum Products, including—

JIMMIE GRAY TOOL JOINT & DRILL COLLAR COMPOUNDS

Sold thru your Supply Store

PETROLEUM DISTRIBUTING COMPANY

BOX 203 - HOUSTON, TEXAS - CHarter 5648

Quality Oil Field Lubricating Oils and Greases

Men in the Industry NEWS

J. R. Doles

J. R. Doles has retired as vice president and general manager of the Ajax Pipe Line Corporation, Springfield, Mo., after nearly 43 years in the pipe line industry. He first joined Oklahoma Pipe Line Company in 1909 as a laborer. Doles was named general superintendent of Ajax in 1930 and on January 1, 1931, was elected vice president and general manager.

•

Oscar L. Keesee has been named manager of Midstates Oil Corporation's activities in Oklahoma with headquarters at Oklahoma City where the company recently consolidated all land, geological and scouting work for the state.

•

P. A. Gass, former superintendent of pipe lines, has been named to the newly-created post of vice president in charge of personnel of Northern Natural Gas Company, Omaha. Gass is a veteran of ten years service at field locations and 12 years in Northern's Omaha offices.

W. B. Haas is the new superintendent of pipe lines. He has been with Northern since June 1, 1931 and has been assistant superintendent of pipe lines since 1943. **P. T. McDonough,** former Pipe Line Division superintendent at Ogden, Iowa, was promoted to assistant superintendent of pipe lines. **C. S. Tonsfeldt,** former pipe line superintendent at Clifton, Kansas, has filled Ogden's position. **Ralph Cotton,** formerly a district foreman at South Omaha, Neb., takes over as division superintendent at Clifton.

•

Ed B. Nickelson has been appointed petroleum engineer for Continental Oil Company's central region, with headquarters in Oklahoma City. He succeeds **W. E. Landrum,** resigned. Nickelson, until recently production superintendent for Hudson's Bay Oil & Gas Company, Continental's Canadian affiliate, with offices in Calgary, Alberta, is a native of Paris, Texas, and attended Texas A. & M. College.

He has been with Continental Oil Company since 1937 and has held petroleum engineering jobs in Wichita Falls, Texas, Ponca City, Okla., and Calgary.

•

R. H. McKinley, district geologist at Wichita Falls for Panhandle Producing and Refining Company, has been promoted to chief geologist at Dallas.

•

John Hansen has been named assistant district landman at Wichita, Kansas, for The Atlantic Refining Company.

R. Lee Hunter has been named director of geological training for Continental Oil Company. He will make his headquarters in Ponca City, Okla., and supervise the company's core drilling operations. A graduate of the University of Oklahoma, Hunter has been with Continental since 1936. He served as a geologist and core drill foreman for 11 years in Oklahoma and Kansas before becoming assistant to the chief geologist in 1947. He is a native of Oklahoma City.

•

James K. Moore has been promoted to supervisor-crude oil for Shell Oil Company's transportation and Supplies-Crude Oil department in Houston. **James R. Willett** was named supervisor-traffic in the Crude Oil department. **Olan Runnels** replaced Moore as chief scout.

•

Roy D. McAninch has resigned from Consolidated Gas Utilities Company, to become a consulting geologist at Oklahoma City. **A. L. Wood,** geologist, has been made head of a new district office for Columbian Fuel Corporation at Tyler, Texas.

•

George Koegler, formerly in the Law department, has been appointed executive assistant to the president of Standard Oil Company (N. J.). Associated with the company since 1943, he succeeds **David A. Shepard,** who became a director of the company last December. A native of New York City, Koegler is a graduate of Lehigh University and Columbia University Law School. After receiving his LL.B. degree in 1928 Koegler was in private practice until joining Jersey Standard.

George Koegler

•

E. P. Priebe, Tulsa, has resigned as internal auditor for Skelly Oil Company, to become secretary-treasurer of Bay Petroleum Corporation, Denver. He has been with Skelly 18 years.

•

Stan Hardison, former district geologist for Kerr-McGee Oil Industries, Panhandle District, has been transferred to Midland, Texas, as district geologist.

•

E. C. Taber, Jr., Shell Oil Company, has been transferred from the post of North Texas division geologist at Wichita Falls to Oklahoma division geologist and has been succeeded in North Texas by **George H. Thompson,** promoted from assistant division geologist in Colorado.

J. Sayles Leach, since 1950 executive vice president of The Texas Company, has been elected president. He succeeds **Harry T. Klein,** president since 1944, who was elected to the newly created post of chairman of the executive committee. **W. S. S. Rodgers** remains chairman of the board.

J. Sayles Leach

Leach joined Texaco in 1916 as a bookkeeper in the Dallas office, and then in 1917 became a traveling salesman in Waco, Texas. By 1925 he had advanced to superintendent of sales in the Dallas district, and in 1927 he became assistant manager of sales for the Southern territory, with headquarters in Houston. In 1929 he was made sales manager of Texaco's Southern territory, a post he held until 1938, when he was elected a vice president of the company. Leach was elected a director in 1941. He moved from Houston to New York City in 1950, on his election as executive vice president.

Leach is a graduate of Baylor University.

•

Samuel P. Ellison, Jr., professor of geology and consultant to the Bureau of Economic Geology and University Lands of Texas, has been appointed chairman of the Department of Geology, University of Texas. He replaces **A. H. Deen,** resigned.

•

Herbert R. Hansen has joined Lawton Oil Corporation as chief of the Purchasing division. Hansen has been assistant director of the Materials Division, Petroleum Administration for Defense, and before that was chief purchasing agent for the Superior Oil Company.

•

J. J. Altrogge has resigned from The Texas Company to open offices as a consulting geologist in the Federal National Bank Building in Shawnee, Okla. He had been with Texaco in Illinois and Oklahoma for 15 years.

•

Emmet E. Wolter has joined the Land and Geological department of Signal Oil and Gas Company and will work in the Bakersfield, Calif., district office with **Robert J. McConville,** district geologist, and **Richard Hester,** his assistant.

The Signal Oil and Gas offices for the area are at Room 354 of the Haberfelde Building, Bakersfield.

•

Charles O. Davis of Mount Pleasant, Mich., an employe of The Pure Oil Company for 27 years, has been named superintendent of operations in the Michigan division of Pure Transportation Company. The former assistant superintendent succeeds **C. L. Bernard,** who will have increased responsibilities in the company in Oklahoma.

Davis has worked on Pure Oil pipe lines in Oklahoma, and has been in Michigan since December, 1944.

Clair E. Cox, who has been with Pure 17 years, succeeds Davis as assistant superintendent. Both will have offices in Mount Pleasant.

C. F. Wilmsmeir has been transferred to the general staff of Western Gulf Oil Company as fiscal and economic advisor to **R. P. Huggins,** vice president. **E. A. Galvin,** formerly technical advisor to Vice President Huggins, has been transferred to the company's Paloma unit in Kern County, California, and will be general superintendent in charge of the Paloma unit, including the cycling plant and production field.

Educated at the University of California at Los Angeles, Wilmsmeir joined Western Gulf in 1938 as a clerk in the Accounting department. He later became chief clerk—accounting, assistant auditor, and assistant manager—accounting. He is a member of the Petroleum Accountants Society and was elected a vice president of that society in 1951.

Galvin received his B.S. in petroleum engineering from the University of Southern California in 1938, and did post graduate work in 1938 and 1939. He joined Western Gulf in 1945 as an engineer and has been chief petroleum engineer and chief enginer as well as teechnical advisor. He is a member of Sigma Gamma Epsilon and AIME.

H-F
PATENTED
"FLEXITE"
Rod Pumps

One of the "Best Pumps in the Oil Patch"

One of the reasons Flexite plunger pumps make good production in almost any kind of well is the Flexite Ring itself. Flexite Rings are made of a special hard plastic composition impregnated with graphite for self-lubrication; they will not corrode, disintegrate, or swell, nor do they require soaking to size before being run in. Unlike ordinary soft rubber and fabric composition plunger rings, Flexite Rings are precision ground to an exact fit in the barrel tube, and the plunger seal is obtained by the built-in inner tension of the step-cut rings. They expand and retract the seal gradually with the pressure of the fluid load during the pumping cycle, thus eliminating sudden, excessive shock and stress on the rod string and power unit.

Flexite rod pumps are available in a wide range of sizes in all standard A.P.I. types, including heavy-duty models with double-thick barrel tubes for deep-well pumping. Harbison-Fischer pumps, sub-assemblies, and parts are sold from stock by supply stores in all major producing areas. Your local store will gladly give you additional information, or you're welcome to write us direct for illustrated bulletins and engineering data. There's no obligation, of course. Harbison-Fischer Mfg. Co., Box 64, Fort Worth, Tex.

HARBISON-FISCHER
"Best Pumps in the Oil Patch"

Joe F. Homer, assistant division petroleum engineer in Humble Oil & Refining Company's Louisiana division, has been promoted to assistant district superintendent of the Grand Isle district. **Philip S. Weathers,** senior clerical supervisor in the policy and organization division in Houston, has been made assistant policy and organization coordinator. **Charles D. East,** senior division clerk for Humble's Southwest Texas division office in Corpus Christi, was transferred to Houston to become senior clerical supervisor. Replacing East in Corpus Christi is **F. P. Beall,** formerly assistant district chief clerk at Kelsey district in Southwest Texas. **Sherman J. Glass,** division clerk for the Gulf Coast division with headquarters in Houston, was transferred to the policy and organization division as clerical supervisor.

•

H. L. Dillon, petroleum engineer, has joined George & Wrather Oil Company at Mt. Carmel, Ill.

•

Cecil Massey has resigned as general manager in the Rocky Mountain area for Ryan Oil Company to become an independent and has been succeeded by **Jerry Ryan.**

•

Paul Lyons has resigned as staff geologist for The Carter Oil Company, to become exploration manager for Anchor Petroleum Company, Tulsa.

Luther H. White, formerly with Sinclair Oil and Gas Company, at Fort Worth, has been appointed chief geologist for McElroy Ranch Company, at Fort Worth.

•

Paul Harper, former Kansas division geologist for Cities Service Oil Company, is now with Anschutz Drilling Company, at Wichita, Kans.

•

W. E. (Pete) Landrum and **R. W. (Bob) Frensley** have resigned from Continental Oil Company and are now associated as petroleum consultants in the firm of Landrum and Frensley at Ardmore, Okla.

•

Homer B. Rainbolt, landman for The Murphy Corporation at Denver, has joined Seaboard Oil Company at Dallas. He is succeeded by **Robert A. Follansbee,** formerly with The Texas Company.

•

W. E. Winn has resigned from Ashland Oil and Refining Company and is now with Southern Natural Gas Company as manager of exploration and production with headquarters at New Orleans.

•

C. T. (Tom) Carden has been named district chief scout of the Superior Oil Company of California with headquarters at Jackson, Miss. He succeeds David Shell, who was transferred to Bakersfield, Calif., as surface geologist.

S. W. Day, Shreveport, has retired as vice president of Interstate Oil Pipe Line Company, climaxing a pipe line career which began 47 years ago in New Jersey when he was first employed as a laborer by the New York Transit Company. After spending four years in various capacities in pipe line construction work for different affiliates of Standard Oil Company (N. J.) he went to work for Standard Oil Company of Louisiana. In 1920 he was called into Standard of Louisiana's Pipe Line department in Shreveport as superintendent of gathering lines and continued in that capacity, after Standard Pipe Line Company succeeded the Pine Line department of Standard of Louisiana, until Jan. 1, 1928, when he was elected vice president of the successor company. Upon the merger of Standard Pipe Line with Standard Oil of Louisiana in 1936, Day served briefly as assistant manager of the Pipe Line department before being elected vice president and general manager of the Pipe Line department of Standard Oil Company of Louisiana on May 1, 1937. When Interstate Oil Pipe Line Company acquired Standard of Louisiana's pipe line properties on Jan. 1, 1945, Day was elected vice president and a director of Interstate, and continued in that capacity until his retirement.

S. W. Day

•

H. E. Zoller, Wichita, **G. L. Peel,** Hoisington, and **I. Hardman,** Hill City, Kansas, have formed the Jet Drilling Company, Inc., with headquarters in Wichita.

•

C. M. Tuller has been elected a member of the board of The California Company. He has been associated with Standard Oil Company of California and affiliates for 30 years.

•

Martin Lobitz, assistant treasurer, and **Volney Hilford,** assistant purchasing agent for Sinclair Oil and Gas Company, were killed February 3 in an automobile accident near Severy, Kansas.

•

G. H. Hagle, Houston, has been appointed acting controller of Continental Oil Company to succeed **T. J. Dowd, Jr.,** resigned. Hagle has been with Continental nearly 20 years.

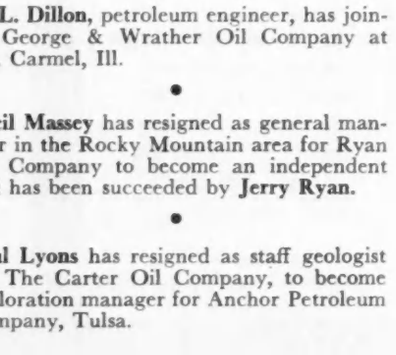
•

A. W. (Bob) Gentry, supervisor of operations for Long Beach Oil Development Company, has resigned to join Fullerton Oil Company as manager of field operations.

•

Kenneth L. Gow has opened an office at 452 Esperson Building, Houston, as a consultant in petroleum geology and engineering. He will do exploration and valuation studies in the Gulf Coast and Rocky Mountain states.

Jefferson Malleable Unions



STYLE "A"

JEFFERSON Style "A" Unions and Style "A" Union Fittings can be furnished with Brass-to-Iron, and Iron-to-Iron Seats.

NON SHOCK COLD W.O.G.

Size	Test Pres.	OWG	SWP
⅛" thru 2"	4000#	2000#	500#
2½"-3" and 4"	2000#	1000#	300#

Our "Iron-to-Iron seat" unions are highly recommended and especially desirable where sulphur content of oil is high; also for chemical services where acid-bearing liquids or gases require the use of iron fittings. AIR FURNACE IRON, having a much denser and finer grain structure, gives a dependable and positive seating surface—ASTM-4733-Grade 35018-53000-lb. M.T.

Obtainable through your jobber

Jefferson Union Company, Inc.

691 West 26th St.,
New York 1, New York

71 Gooding St., Lockport, New York — 31 Fletcher Ave., Lexington 73, Mass.

Transfers and Promotions

P. H. Bohart, vice president of the Tulsa division, Gulf Oil Corporation, announced the following personnel changes in the Exploitation department's engineering staff in Tulsa: **E. W. Brake** will continue as chief engineer and engineering advisor with **A. C. Godbold** as his assistant; **C. A. Buskel** heads a newly-created gas-gasoline engineering unit with the title of division gas-gasoline engineer; **R. M. Stuntz** heads the mechanical engineering section as division mechanical engineer with **S. H. Pope** as assistant division mechanical engineer; **R. B. Wilkins** will head the petroleum engineering section with **F. L. Carpenter** as assistant division petroleum engineer; **J. P. Wible, Jr.,** was promoted to secondary recovery advisor on the staff of the manager of exploitation . . . **E. P. Neal,** Tide Water Associated Oil Company, Tulsa, has been promoted from district geologist to regional geologist supervising activities in Oklahoma, Kansas and the Texas Panhandle. **Lyman E. Galbraith** succeeds Neal as district geologist with headquarters at Oklahoma City . . . Personnel changes involving eight Sun Oil Company geologists have been announced. **S. M. Vauclain** moves from Jackson, Miss., to the Philadelphia office. **Emil Monsour,** San Antonio, replaces Vauclain and **J. R. Moyer,** Dallas, replaces Monsour. **D. H. Cardwell,** San Angelo, and **George R. Washburn,** Roswell, N. M., move to the Dallas office. **Walter L. Erwin,** Truth or Consequences, N. M., moves to Abilene, Texas, and **James J. Tucker,** Corpus Christi, Texas, goes to Dallas. **Forrest W. Bell,** Delhi, La., was transferred to Shreveport.

Joseph Neely has been transferred from Tyler, Texas, where he was district geologist in charge of the East Texas district, to Midland, Texas, where he is district geologist for Magnolia Petroleum Company's West Texas district. Neely replaces **H. A. Hemphill,** who resigned. **Wayne R. Hammond** has been transferred from Magnolia's general offices in Dallas to Tyler, where he is district geologist in charge of the East Texas district. **W. Lloyd Haseltine** has been moved to Dallas as regional geologist in charge of the development section. Haseltine has been district geologist at Mount Vernon, Ill. A new geological district has been formed with headquarters at Bismarck, N. D. This district, which includes the states of North and South Dakota, will be directed by **P. R. Tetrick,** who has been promoted to district geologist. **Charles A. Miller,** petroleum engineering assistant in the Kermit Producing district, and **J. E. Middleton,** petroleum engineer in the Falfurrias district, have been transferred to the Producing division and made assistant foremen. **J. Edgar Middleton** has been transferred from the Petroleum Engineering department of Magnolia's Falfurrias Producing District to the Pegasus district in West Texas, where he is serving as assistant production foreman. **Asa D. McRae** has been promoted from geologist at Lake Charles to district geologist in charge of Magnolia Petroleum Company's Illinois district with headquarters at Mount Vernon.

Don Anderson, superintendent of production, natural gas division, Cities Service Oil Co. (Del.) has been transferred from Bartlesville, Okla., to Calgary, Canada, where he will supervise drilling and production operations in the Canadian plains area . . . **Richard M. Kobdish,** former district superintendent of production at Crane, Texas, for Sinclair Oil and Gas Company, has been promoted to assistant division superintendent of production of the West Texas-New Mexico division with headquarters at Midland, Texas.

•

C. P. Watson, vice president of the Western division of Seaboard Oil Company of Delaware, retired on April 30. Seaboard's western division operates in California, the Rocky Mountains, and Canada.

Watson, who has been with the company since 1930, will be retained as a consultant by Seaboard.

Norman A. Rousselot, assistant vice president of the company and Watson's assistant, will succeed him in charge of Seaboard's Western division.

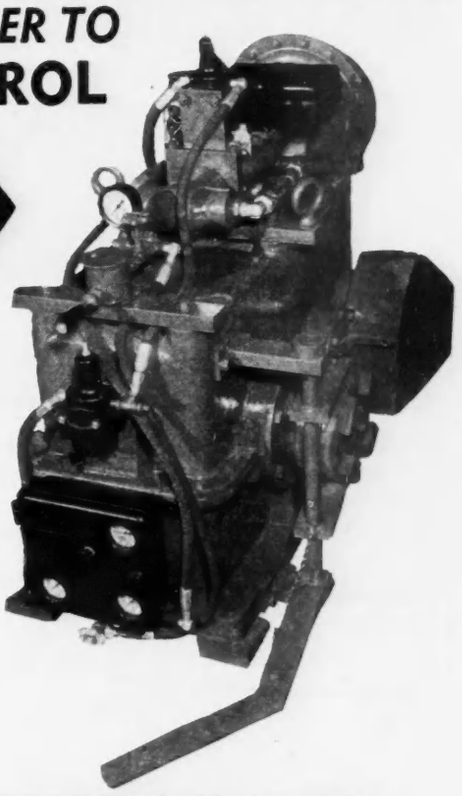
•

Delmar H. Larsen, formerly with Baroid Sales Division, National Lead Company, has opened offices in Los Angeles as a consulting chemical and petroleum engineer and patent agent. He was with Baroid for 15 years, until that firm moved to Texas, and was director of research and more recently manager of the patent department.

TO UNIT RIG 15 OPERATORS

HERE IS YOUR ANSWER TO WEIGHT CONTROL

TAILOR MADE FOR UNIT RIG 15



You rig operators know the key to maximum drilling rates are dependent on keeping constant weight on your bit under all drilling conditions at all times.

The Texas Flange Company has the answer to your UNIT RIG "15" weight control problems in the new Model "15" "HOLEMAKER."

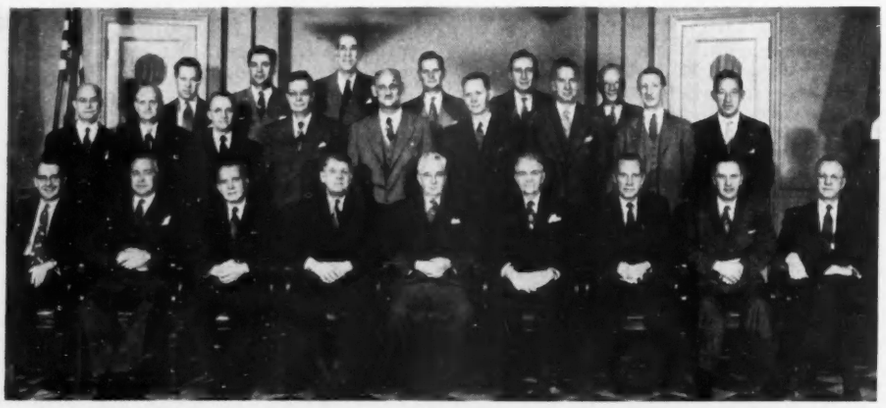
This device operates on a simple mechanical - hydraulic principle — keeping a constant weight on the bit regardless of formation.

MODEL "15" "HOLEMAKER"

• MAKES HOLE FASTER • FINGERTIP CONTROL • DRILLS HOLES STRAIGHTER • CHAIN DRIVE ELIMINATED • NO PISTONS, RODS, VALVES OR PACKING GLANDS IN HYDRAULIC MOTOR TO STICK OR RETARD OPERATION • SIMPLE & EASY TO INSTALL IN FIELD • REQUIRES MINIMUM SPACE • NO EXTRA DRIVE OR AUXILIARY EQUIPMENT TO BUY

TFC TEXAS FLANGE CO.

P. O. BOX 1352 ODESSA, TEXAS DIAL 6-6877



THE TEXAS COMPANY's Producing Committee is pictured as it met in New York. Seated, left to right, are A. W. Baucum, W. C. Kneale, J. N. Troxell, E. R. Filley, R. F. Baker, A. R. Wilson, R. L. Keyes, J. H. Puls, and C. B. Williams. Standing are A. C. Hunter, G. M. Clement, J. D. Elson, Jr., M. L. Terry, J. H. Rambin, Jr., E. P. Hayes, T. T. Freeman, W. V. Vietti, R. L. Lay, J. C. Brooks, R. E. King, H. H. Arnold, Jr., W. J. Hanley, T. W. G. Thomson, and G. Herzog.

J. R. Chestnolvick, former area production engineer for Continental Oil Company in Fort Worth, has been promoted to assistant district superintendent of production in Hobbs, N. M.

•

A. J. Viets has been appointed regional land superintendent in Dallas for Sun Oil Company. He was formerly land superintendent for the Corpus Christi area.

George P. Moncrief has been named assistant production field superintendent in charge of Sun's Premont, Texas, area. He formerly was district engineer at Midland, Texas.

Succeeding Moncrief at Midland is **D. C. Brown,** formerly field engineer for the Snyder, Texas, area. **C. E. Rogers** is the new field engineer at Snyder.

Other personnel changes included appointment of **Ray Bray** of Midland as district landman at Tallahassee, Fla.; **G. M. Adair** of LaGrange as landman at Jackson, Miss.; **H. T. Teel** of Premont as foreman at Victoria, and **J. W. Metcalf** of Longview as foreman in that area.

•

James E. Keenan has been appointed assistant supervisor of exploration for the Rocky Mountain division of General Petroleum Corporation.

C. E. Carlson succeeds Keenan as district geologist for Montana, with headquarters in Billings, Mont. Keenan will be located in Casper, Wyo.

Keenan joined General Petroleum in 1946 after four years with the Magnolia Petroleum Company, with which General Petroleum is affiliated. He will report in his new position to **K. A. Gorton,** supervisor of exploration for the Rocky Mountain division.

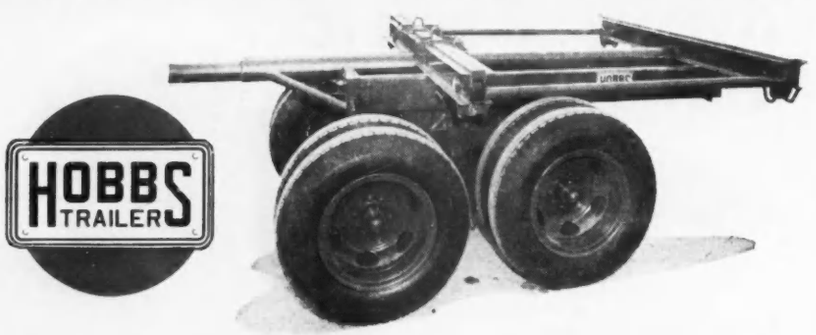
Keenan is a graduate of the University of Missouri, having received his master's degree in geology there in 1940, and is a member of the American Association of Petroleum Geologists.

Carlson joined General Petroleum in 1949 after receiving his master's degree in geology from the University of Wyoming. Carlson has worked in General Petroleum exploration offices in Worland, Wyo., and Great Falls, Mont.

•

Bruno R. Schabarum has been elected president of the Carl B. King Drilling Company, Midland, Texas, succeeding **J. Ed Warren** who has been called to Washington to assume the duties of deputy administrator of the Petroleum Administration for Defense. At the same time Schabarum announced the promotion of drilling superintendent **C. J. (Dutch) Jensen** to vice president, and the appointment of **H. Don Johnson,** accountant-office manager, to the post of secretary-treasurer.

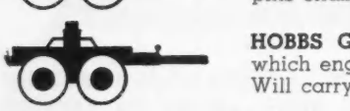
HAUL 'EM with HOBBS



OIL FIELD and PIPE LINE POLE TRAILERS

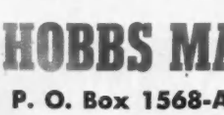
A variety of sizes and types of Hobbs Pole Trailers enables you to solve every oil field and pipe line hauling problem where you have to move large objects which can "bridge" or span a gap, or various lengths of casing or pipe. Tell us YOUR problem.

HOBBS OFS Style—in sizes for 2, 3, 5-ton trucks. Telescoping tongue engages clevis type hitch on oil field truck body.

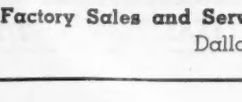


HOBBS PLS Style—in sizes for 2, 3, 5-ton trucks. Telescoping tongue engages front bolster which has kingpin to engage fifth wheel mounted on truck.

HOBBS WT-4—Wagon-type tandem with pivoted front axle held in trailing position with two pins. Pulling the pins enables you to pivot 15 degrees in each direction.



HOBBS G-4 and G-104—Tandem models with tongue which engages clevis type hitch in oil field truck body. Will carry all that load limits permit.



HOBBS G-44 and G-1044—See photo above. Telescoping tongue engages front bolster which has kingpin to engage fifth wheel mounted on oil field truck.

For Details, Specifications, Prices, Please Direct Your Inquiry To

HOBBS MANUFACTURING COMPANY

P. O. Box 1568-A **FORT WORTH 1, TEXAS**

Factory Sales and Service—Fort Worth, Houston, San Antonio, Lubbock and Dallas. Names of distributors on request.

DEATHS

George Franklin Mitchell, 64, president of American Gas Association and president of The Peoples Gas Light and Coke Company, Chicago, died March 26 in St. Francis hospital, Evanston, Ill.

Mitchell

Mitchell had been prominent in the Chicago utilities field for many years. He had been president of The Peoples Gas Light and Coke Company since Feb. 26, 1930, and was a director of Natural Gas Pipe Line Company of America, Texas Illinois Natural Gas Pipeline Company and Chicago District Pipeline Company, all subsidiaries of Peoples Gas.

Mitchell was born in Chicago March 20, 1888, and was educated in the public schools there.

•

C. G. Worthy, 62, Magnolia Petroleum Company Vanderbilt district superintendent, died April 12. A member of the Magnolia organization for 40 years, Worthy was responsible for the early development of many Magnolia reserves including Luling and West Ranch. First assigned to the Drilling department, Worthy transferred to the Producing department during the initial stages of the Luling development program.

•

Max Steineke, 54, who did pioneer geological exploration in Saudi Arabia, died at his home in Los Altos, Calif., April 16. Steineke was a member of the American Association of Petroleum Geologists and last year was awarded the Sidney Powers memorial medal for "distinguished and outstanding achievement in petroleum geology" which resulted in discovery of vast oil resources in Saudi Arabia. He was chief geological consultant to Arabian American Oil Company.

•

Joe Baker Tims, 53, pipeline superintendent for Lion Oil Company, died April 9 at his home in El Dorado, Ark.

•

Oscar L. Garrett, co-owner of Petroleum Tool Company of Odessa, Texas, died at Mayo Clinic, Rochester, Minn., March 22. Born December 30, 1904 in El Paso, son of Pat Garrett, famous sheriff of Lincoln County, New Mexico, he started as a cable tool dresser during the Tampico boom and later moved to Venezuela, where he worked up to personnel manager of a major American company. Returning to Houston in 1937, he was active in drilling and supply circles, moving to Odessa in 1947. In 1950 he and D. P. Blaker organized Petroleum Tool Company.

•

Jackson Evander Josey, Jr., 52, Houston independent oil man, died March 27. Josey, president of Pine Lodge Oil Company, attended Virginia Military Institute, Rice Institute and the University of Texas.

•

Harry Pulaski, 66, independent oil operator of Houston, died February 19. Pulaski was founder of the Pulaski Iron and Metal Corporation, which he operated until about 12 years ago, when he entered the oil business as an independent producer. He was a charter member of the Houston Petroleum Club, and a member of Tipro and IPAA.

Clement W. Walker, 63, assistant manager of the materials and purchasing department of Mid-Continent Petroleum Corporation, and former president of the Purchasing Agents Association, died March 24, in a Tulsa, Okla., hospital.

•

James T. Kiester, 75, former Oklahoma drilling contractor, died March 21 in a Bartlesville, Okla., hospital. He moved to Indian Territory in 1905 and settled in Dewey, Okla., later moving to Tulsa where he maintained headquarters for a number of years while operating in Oklahoma and Texas.

E. N. Foster, 57, division purchasing agent for Gulf Oil Corporation, died March 18 in Houston. He had been associated with Gulf since 1919. Foster was first employed by Gulf as a purchasing agent in Wichita Falls, Texas. He later worked in Fort Worth, West Texas and Tampico.

•

Lee R. Payne, 58, of Tulsa, died April 1 after a brief illness. He was an independent oil producer and for the last 15 years had been associated with the Herndon Drilling Company of Tulsa.

•

F. W. Butler, 55, former vice president and director of The Carter Oil Company, died March 19, in Bronxville, N. Y. He recently completed 30 years service with Standard Oil Company (N. J.).

No "High Place Fear" in Scottie McBlock, he's balanced for safety!

Write for Catalog

When *Balance* Counts . . . . . .

SMART OPERATORS SPECIFY

McKissick Type RP

TRAVELING BLOCKS

McKissick R. P.'s are safety insured by concentration of 70% of their weight below center of lift.

McKissick R. P's are speed insured for more fast falling round trips per given time.

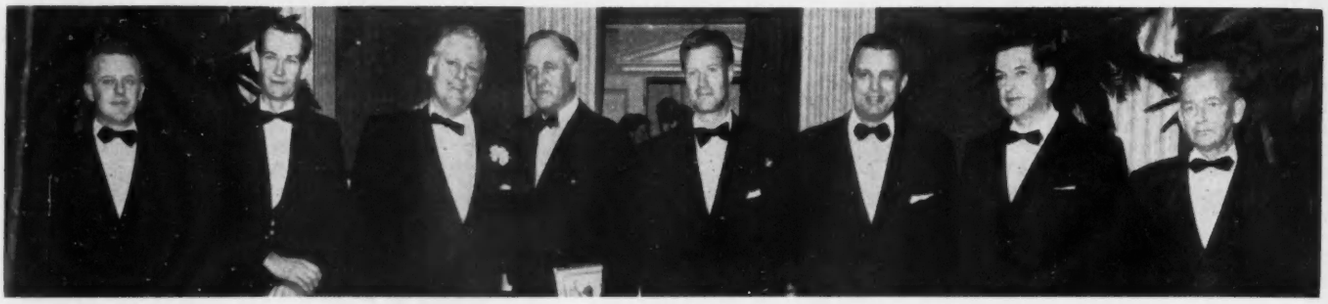
McKissick R. P's are life insured by Hiatt Hi-Load roller bearings, flame hardened sheaves, grooved to proper line size.

McKISSICK BUILDS A BETTER BLOCK FOR EVERY PURPOSE.

McKISSICK

McKISSICK PRODUCTS CORPORATION
Box 2496 Tulsa, Oklahoma

Associations



NEW OFFICERS of the Los Angeles chapter of Nomads get together at the 13th Annual Inaugural Ball at the Ambassador Hotel in Los Angeles. Left to right are John W. Rife, executive secretary; R. W. Craig, assistant secretary; James D. Hughes, secretary; James D. Engstrand, retiring president; W. A. Wilson, vice president; H. J. Schlarb, deputy sergeant-at-arms; John H. Flanagan, treasurer, and B. E. Mater, assistant treasurer. Not shown are Earle M. Rees, president, and W. H. Sargent, sergeant-at-arms.

IPE Definitely Set in Tulsa After Poll of Contractors

Following a survey of oil and drilling contractor companies indicating a large attendance of petroleum industry operating and specifier personnel, for the May 14-23, 1953, International Petroleum Exposition in Tulsa, the executive committee of the IPE has definitely confirmed the show, according to W. G. Skelly, president of the Skelly Oil Company and president of the IPE.

"The poll on attendance was made," Skelly said, "after a number of the larger exhibitors had expressed concern and urged postponement until 1954.

"These exhibitors were concerned about the stepped-up drilling program which the government is requesting for 1953 and doubted if some of the exhibitors would have equipment to show and also if the companies would be able to send their personnel to the show."

E. F. Bullard, president of Stanolind Oil & Gas Company and member of the IPE executive committee, and Skelly made the cross-section poll of the industry on attendance and reported full cooperation on attendance.

Skelly further said that following the announcement earlier that the executive committee had recommended a show in 1953, that more than 500 requests for space had been received, with about 60 percent of former exhibitors asking for more space.

"Medium-sized and small-sized exhibitors definitely want the show, the reservations indicate," Skelly said.

Forty-three countries and 29 states of the U. S. were represented by attendance at the last exposition held in Tulsa in 1948.

Leach Is Named Chairman Of API Study Committee

J. S. Leach, of The Texas Company, New York, has been appointed chairman of The American Petroleum Institute's Study Committee on Special Projects.

Leach succeeds A. Jacobsen, president of Amerada Petroleum Corporation. Other members of the committee are A. E. Johnson, of Argo Oil Corporation, Denver; P. E. Lakin, Shell Oil Company, San Francisco; N. C. McGowen, of United Gas Pipe Line Company, Shreveport, La.; R. L. Minckler, of General Petroleum Corporation, Los Angeles; E. L. Shea, of The Ethyl Corporation, New York; A. A. Stambaugh, of Standard Oil Company (Ohio), Cleveland; Henderson Supplee, Jr., The Atlantic Refining Company, Philadelphia; W. K. Warren, Warren Petroleum Corporation, Tulsa, and Burl S. Watson, Cities Service Company, New York, N. Y.

Completely Air Conditioned — 4 CONVENIENT LOCATIONS

LOMA ALTO HOTEL — 4518 LEMMON AVE.

LAWN HOTEL — 3718 LEMMON AVE.

LAKEWOOD HOTEL — 1818 ABRAMS RD.

LYNN HOTEL — 3405 GASTON AVE.

DALLAS, TEXAS

University of Texas Bureau To Collect Oil Film Library

A special film library on petroleum subjects will be collected in Austin by the University of Texas Visual Instruction Bureau. A catalog will be prepared and issued to the oil industry following a survey now in progress.

Oil and oil supply concerns may deposit films in the collection. Pictures will be available throughout the industry, without rental charge, but a nominal service charge will be made for maintenance and repair.

Ernest Tiemann, director, invited individuals and companies having films to add to the collection, or needing films for specific purposes, to communicate with him at the Division of Extension, University of Texas, Austin 12.

Geophysical Society Meets May 29 and 30 in Houston

The Society of Exploration Geophysicists, Houston section, will hold its annual Gulf Coast regional meeting May 29-30, in the Crystal Ballroom of the Rice Hotel, Houston.

Earle W. Johnson, president of General Geophysical Company and president of the Houston Section of SEG, said most of the papers presented will concern geophysical problems, but several geological subjects will be discussed. The Houston Geological Society, headed by Ralph B. Cantrell, consultant, will cooperate with the geophysicists in sponsoring geological papers. Eugene W. Frowe, of Robert H. Ray Company, is in charge of arrangements.

Incoming officers of the Houston SEG section will be installed May 29 at the annual dinner meeting.

1953 API Meeting Dates Set

The Executive Committee of the Board of Directors has approved November 9 through 13 for the 1953 annual meeting of The American Petroleum Institute. The meeting will be in Chicago. This year's meeting also will be held in Chicago, November 10 through 13.

NEW OFFICERS of the Mid-Continent District of the American Petroleum Institute's division of production are shown with Harold E. Berg, Tulsa, far right, retiring chairman of the production group. About 850 delegates from Kansas, Oklahoma and the Texas Panhandle attended the recent three-day meeting in Wichita, Kansas. New district officers are, left to right: A. H. Massad, Wewoka, Okla., vice-chairman northeastern Oklahoma; Jack Worley, Wichita, vice-chairman for eastern Kansas; S. K. Myers, Great Bend, Kansas, vice-chairman for western Kansas; G. C. MacDonald, Tulsa, new district chairman; H. M. Cooley, Tulsa, secretary-treasurer, and past chairman Berg. Not shown are Fred Neslage, West Pampa Repressuring Association, Pampa, Texas, vice-chairman for Texas Panhandle, and Berdun Leonard, Duncan, vice-chairman for southwestern Oklahoma.

Posts on Nomads' National Board Go to Olson, Berlin

A. J. Olson

Courtney J. Berlin

A. J. Olson, past president of the Dallas-Fort Worth chapter of Nomads, has been elected chairman of the National Board of Regents for 1952. Courtney J. Berlin was named secretary-treasurer.

After graduating from Iowa State College with a B. S. degree in mechanical engineering, Olson went to work for Fairbanks-Morse Company in Chicago. In 1927 he became machinery sales engineer for Continental Supply Company in Tulsa. He is now chief engineer of Continental Supply with offices in Dallas.

Berlin is a graduate of the University of Michigan and formerly worked for The Ohio Oil Company. In 1941 he joined Baker Oil Tools, Inc., as a sales engineer. He is now division sales engineer with that company with offices in Dallas. Berlin served two terms as secretary of the Dallas-Fort Worth chapter of Nomads as well as one term as president.

Texaco's 50th Anniversary Observed by 7000 Old Timers

More than 7000 active and retired employes of The Texas Company, members of the Texaco Quarter Century Club, celebrated the company's 50th anniversary April 7 with simultaneous birthday dinners in 29 communities. W. S. S. Rodgers, chairman of the board, speaking from Houston, and the company's president, Colonel Harry T. Klein, in New York, spoke over a telephone hookup connecting the dinners. They were introduced by J. Sayles Leach, executive vice president.

J. T. Rynd, president of The Texaco Old Timers Club of Houston, presided. Sixty-seven employes received gold watches for 30 years of service and emblems for 25 years.

Rodgers paid tribute to the loyalty of the company's 42,000 active and retired employes and its more than 115,000 stockholders. "Our greatest asset," he said, "is the people of this company."

Colonel Klein, speaking from New York, said he was "confident Texaco will grow, above our power to foresee, and its achievements will be even greater" in its second half-century.

The Quarter Century Club dinners were held in Boston, Buffalo, Chicago, New York, Philadelphia, Norfolk, Dallas, Denver, El Paso, Houston, Indianapolis, Los Angeles, New Orleans, Shreveport, San Antonio, Tulsa, Minneapolis and Savannah. Also in Amarillo, Beaumont, Kilgore, Port Arthur, Midland and Wichita Falls, Texas; Lawrenceville and Salem, Ill.; Butte and Sunburst, Mont., and Casper, Wyo.

Southeast Geologists Elect

C. L. Moody, of Shreveport, has been elected chairman of the recently formed Southeastern Section of the Geological Society of America. Other officers are Jasper L. Stuckey, Raleigh, N. C., vice chairman; and C. W. Wilson, Jr., Nashville, secretary.

Cornell Heads Kansas Group

Kansas Geological Society has elected as president, Lee H. Cornell of Franco-Central Oil Company. William M. Brodrick, Anderson-Prichard Oil Company, is vice president, and Brian Kirby, Jr., Sunray Oil Company, is secretary-treasurer.

For Sale

50-Ft. Chris Craft Cruiser

Probably the finest, most beautiful, most complete ship of its size and kind on Gulf waters. 1951 model, delivered by factory Dec. 30, 1950. Used less than 200 hours. Twin screw, 160 H. P. each engine, with 2½ to 1 reduction drive. Dual controls, operated either from bridge or main cabin, 110 volt, 3000 watt lighting system, also 12 volt emergency system, 2 toilets, 1 electric, 2 lavatories, 1 tiled shower, hot and cold water, 1 electric refrigerator, 1 500 lb. ice box and two other ice boxes on stern for fish or beverages. 2 rubber-foam upholstered chrome fishing chairs in stern cockpit. Beds are Simmons innerspring mattresses with box springs. CO-2 automatic fire system, boatector and automatic electric bilge pumps. Only 2½% insurance rate. The price is more than right if you want a boat of this caliber. By appointment only. Call N. L. Naylor, Preston 8171 or write 504 M & M Bldg., Houston.

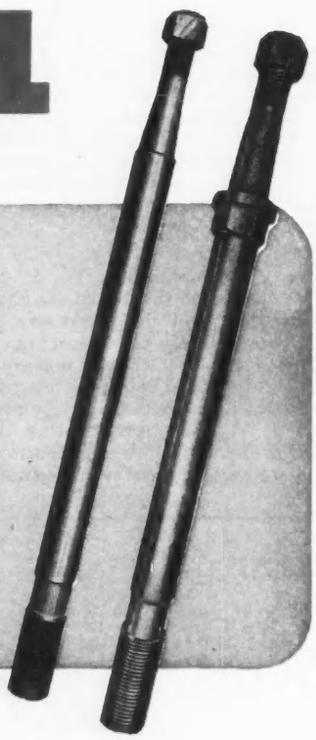
Companies in the News

VEGA CORPORATION, a petroleum exploration organization recently formed in Texas by a group of Southern California operators, has established offices at 401 North Colorado Street, Midland, Texas. **Gordon T. Buskirk** who recently resigned as West Texas district geologist for Stanolind Oil & Gas Company has joined Vega as vice president and general manager.

Vega was organized and is owned by Christopher Oil Company, Ltd. (a limited partnership recently formed by the Thomas P. Pike interests), Basin Oil Company of California, Bolsa Chica Oil Corporation, and Thomas W. Simmons, all of Los Angeles.

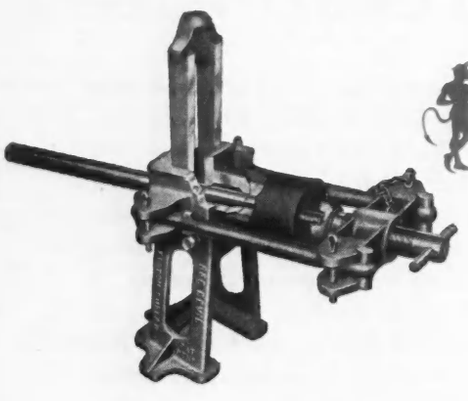
RED DEVIL

"DIA-HARD" PISTON RODS



For high pressure abrasive service

RED DEVIL Piston Rods are first choice where drilling conditions are severest because of the extreme hardness of the deep HIGH-CARBON wear resistant "DIA-HARD" case, coupled with tough core properties which give the highest tensile strength against breakage. All rods are hardness tested and precision gauged to maintain a world-wide reputation for quality. Write for Catalog No. P-101.



RED DEVIL PISTON PULLER

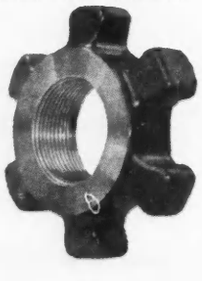
For tapered type rods

The usual practice of removing pistons from rods by blows of a sledge hammer often damages either pistons or rods. A Red Devil piston puller easily and quickly removes badly stuck pistons without injury to either part. All elements are made of finest quality alloy steel, heat-treated for strength and long life. Write for Catalog No. P-106.

RED DEVIL PISTON ROD LOCK NUT

These "Hammer Lug Type" nuts provide a fast and positive means for locking piston rod in crosshead. Made from alloy steel and heat treated, they will last indefinitely. Face of nut is precision machined for full seating surface at right angles to axis of threads to prevent fatigue stresses in rod. Write for Catalog P-102.

Complete information in Composite Catalog or write for price catalogs noted above. Red Devil products are available through your supply store.



OIL WELL MANUFACTURING CORP.

6008 S. Alameda St., Los Angeles 1, Calif.

TENNESSEE GAS TRANSMISSION COMPANY, STANOLIND OIL AND GAS COMPANY and **HUMBLE OIL & REFINING COMPANY** have made available three fellowships at Texas A. & M. College, College Station, Texas.

The TGT fellowship will promote research work to be done preferably in the field of natural gas transmission. The Stanolind fellowship was established to encourage graduate studies in the field of petroleum research. The Humble fellowship also is in the field of petroleum engineering.

All three fellowships cover a ten-month period beginning September, 1952.

•

OCEANIC COMPANY has been formed as a part of Oceanic Oil Company's exploratory program, it was announced by Oceanic Oil Company and J. Barth and Company, Investment Bankers. A total capitalization of $1½ million is contemplated. Oceanic Oil Company, with its head office in Los Angeles, has exploration offices in Bakersfield and Ventura, Calif, Midland and San Antonio, Texas, and is opening an office in Billings, Mont.

•

THE TEXAS COMPANY is erecting a two-story laboratory building for the Research Division of the Producing department. The new structure is at Bellaire, Texas, adjacent to the Producing Laboratory building. The first floor will be partitioned into ten laboratory rooms with adjoining offices and a large auditorium and library. On the second floor will be offices, laboratories and the Drafting department.

•

PLATTE PIPE LINE COMPANY directors have decided on Kansas City, Mo., as the site of the permanent offices of the company. Temporary offices will be at Independence, Kansas, until the new quarters are completed, Platte officials said, so that they can have the benefit of Sinclair Pipe Line Company's technical and operating services. The $60 million Platte crude line extends from Wyoming to the Wood River area of St. Louis, and is connected with other lines in the Wood River area. Owners are British American Oil Company, Ltd., Continental Oil Company, The Ohio Oil Company, The Pure Oil Company, and Sinclair. Microwave communications will be used between the new headquarters and the Platte line, which passes just north of Kansas City.

•

SAN JUANITO OIL COMPANY has entered into a contract to operate all of the properties of Texas Consolidated Oils of Dallas. These properties include approximately 400 producing oil and gas wells in Oklahoma, Texas, Louisiana, New Mexico, Kansas and California. The company is currently producing approximately 3500 barrels of oil per day.

Equipment and Service Suppliers' Notes

CUMMINS ENGINE COMPANY, INC., recently held a three-day meeting for regional service representatives at Columbus, Ind. Attending were, left to right: Dillard Davis, central regional office, Chicago; Leon O'Neal, southwestern regional office, Los Angeles; Norman Grimes, southeastern regional office, Atlanta; Richard Carlson, eastern regional office, New York City; Ralph Shields, northwest regional office, Seattle; Jack Mitchell, Great Lakes regional office, Cleveland and Arch Herron, Rocky Mountain regional office, Denver.

Link-Belt Elects R. C. Becherer President and Adds Two to Board

Link-Belt Company, at its annual meeting, increased the number of directors from 12 to 14. The two new directors are Robert C. Becherer, executive vice president of the company, and William J. Kelly, president of Machinery & Allied Products Institute.

At the directors' meeting, Becherer was elected president to succeed George P. Torrence, who is retiring from active service in accordance with the company's retirement plan. All other officers were reelected.

Baash-Ross Names Lee J. Laird Assistant General Sales Manager

Baash-Ross Tool Company has named Lee J. Laird assistant general sales manager of the company. This is in addition to his duties as manager of California sales.

Lee J. Laird

In his new duties, Laird will cover the California area and will travel throughout the Rocky Mountain, Mid-Continent and Gulf Coast areas assisting E. M. Gearke, general sales manager. He will have headquarters in Los Angeles.

Worthington Pump and Machinery Votes to Change Name of Firm

Stockholders of Worthington Pump and Machinery Corporation at their annual meeting in Wilmington, Del., reelected the present board of directors and voted to change the company's name to Worthington Corporation.

H. C. Ramsey, president, said no corporation policies will be affected by the name change. Ramsey pointed out that continued reference to "pumps" in the name tended to lead the public into the erroneous conclusion that pump manufacture was the corporation's only endeavor. He pointed out the varied operations of the firm in explaining the name change.

Wells Given Honorary Degree By West Coast University

In recognition of distinguished service to advancement of engineering education, Walter T. Wells, chairman of the board of directors of Lane-Wells Company, was awarded an honorary degree of Doctor of Science by West Coast University in Los Angeles. In recent years, Wells has filled a number of educational posts for the state of California. He is now a member of the State College Council, representing California State Polytechnic College.

New Headquarters in Los Angeles Acquired by Oil Well Division

New offices and warehousing buildings in Los Angeles have been acquired by the Oil Well Supply Division of U. S. Steel Company at 49th street and Santa Fe Avenue, Donald S. Grubbs, manager of the California area, recently announced.

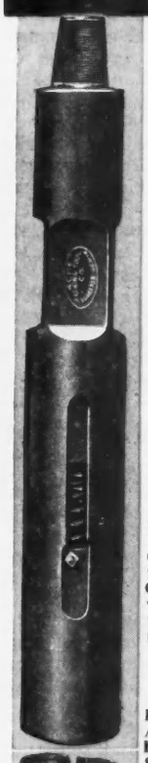
The new property contains two buildings, one of steel and the other of brick and covers 54,300 square feet. There is also a paved yard of an additional 26,430 square feet.

Greatest Name in Cable Tools

Acme

TRUSTWORTHY SINCE 1900

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER



Socket Slips

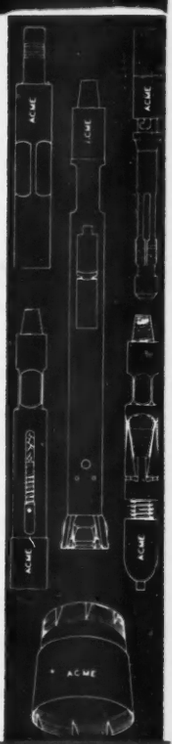
See Acme's Insert in 1951 Composite Catalog. Also write for more complete Catalog, containing valuable cable tool "use and care" manual.

Fig. 208 — Acme Combination Socket. . . . 51-years' specialized "know-how" makes them worth more to YOU.

. . . to-be-Sure—Always Ask for Acme Sockets . . .

With a "yen" for toughest fishing jobs—hard jarring and all—Acme Combination Sockets help Drillers recover, quicker and surer, so called "hopelessly" stuck tools. Their distinctive design embodies ½-century's accumulated experience of our own fishermen; field specialists famous for meeting fishing problems.

From billet to finished tool, every field-service factor is rigidly observed: PREMIUM-grade steel; forgings CORRECTLY heat-treated; craftsmanship to detailed EXACTNESS. Acme Sockets have essential "built-in" design for extreme up-jarring, with least bursting stress: Correct spacing, depth, angle and super slip-wicker hardness. Also unique design of slips and slip-seat taper.



ACME DRILLING & FISHING TOOLS

ACME FISHING TOOL CO.
PARKERSBURG W. VA.
Export Office:
19 Rector St., New York 6, N.Y.

UNDER THE CHAIRMANSHIP of H. P. Boncher, the four committee members served as panel Group 1 in the first Dresser Industries conference discussion of "Executive Training and Development." Left to right: A. R. Weis, president, Pacific Pumps, Inc., Huntington Park, Calif.; R. E. Reimer, vice president, secretary and treasurer, Dresser Industries, Inc., Dallas; Boncher, (chairman), general manager of Dresser Manufacturing Division, Bradford, Penn., and vice president of Dresser Industries, Inc.; H. N. Mallon, president, R. P. Brown, director of personnel and organization planning, J. B. O'Connor, executive vice president, and T. L. Moody, director of industrial relations, all of Dresser Industries.

PANEL DISCUSSION Group 3 on "How to Evaluate Sales Applicants and Salesmen in Your Employ." Left to right: G. W. Walton, vice president, Dresser Equipment Company, IDECO Division, Dallas; E. H. Lancaster, Jr., manager field service, Magnet Cove Barium Corporation, Houston; W. F. Slater, manager, hydraulic equipment sales, Kobe, Incorporated Division, Dresser Equipment Company, Huntington Park, Calif.; G. W. Probst, western regional sales manager, Clark Brothers Company, Inc., Chicago, Ill., and F. W. Laverty (chairman), general sales manager, Clark Brothers Company, Inc., Olean, N. Y.

PANEL DISCUSSION Group No. 2 on "Can Salesmen Be Trained?" Left to right: George H. Moore, sales manager, Magnet Cove Barium Corporation, Houston; E. J. Weis (chairman), vice president, Pacific Pumps, Inc., Huntington Park, Calif.; L. E. Moffatt, Manager special products sales, Dresser Manufacturing Division, Bradford, Penn. (Seated): R. A. Dunbar, president, Mid-Continent Division, Pacific Pumps, Inc., Tulsa.

PANEL DISCUSSION Group 4 on "The Organization Planning of a Well-Rounded Out Sales Department." Left to right: D. A. Johann, general sales manager, Roots-Connersville Blower Corporation, Chicago, Ill.; R. R. Newquist (chairman), executive vice president, Roots-Connersville Blower Corporation, Connersville, Ind.; H. Z. Hight, sales manager, Dresser Manufacturing Division, Bradford, Penn.; (Back row): Max B. Campbell, vice president, Security Engineering Company, Inc., Whittier, Calif.; A. E. Harvey, vice president, Stacey Brothers Division of Dresser Stacey Company, Cincinnati, Ohio.

Dresser Industries Executives Start Management Conferences

Top management of Dresser Industries, Inc., concerned with maximum use of executive sales personnel including company managers, sales executives, vice-presidents and top management officials, convened at Los Angeles in the first of a series of continuing quarterly executive management training conferences.

Panel discussions by representatives of ten companies operating under Dresser Industries, Inc. management focused attention on sales training, operating and organization problems of common interest.

To provide this trained management force as well as develop a means of easy communications of ideas, opinions and experience leading to a better understanding of common problems and methods employed by others, H. N. Mallon, president of Dresser Industries, Inc., Dallas, appointed as an executive training committee of top Dresser executives, Richard Porter Brown, personnel director in charge of organization planning; Thomas L. Moody, director of industrial relations, and Arthur Weis, president, Pacific Pumps, Inc., Dresser subsidiary at Huntington Park, Calif., and vice-president of Dresser Industries, Inc. Under the chairmanship of H. P. Boncher, Dresser Industries vice president, and general manager of the Dresser Manufacturing Division at Bradford, Penn., this committee reviewed the research and executive training programs of more than 60 of the foremost national companies before undertaking an overall program.

The first three-day program started with visits to four Dresser Industries subsidiary plants: Pacific Pumps, Inc., Kobe Division at Huntington Park and IDECO Division at Torrance, Calif., or Dresser Equipment Company; and Security Engineering Company at Whittier, Calif.

Subsequent quarterly executive training sessions will be held in various sections of the country where Dresser plants are located.

Included in these conferences were the following Dresser officials and sales heads: Dresser Industries, Dallas, H. N. Mallon, president; J. B. O'Connor, executive vice president; R. E. Reimer, vice president, secretary and treasurer; T. L. Moody, director of industrial relations; R. P. Brown, director of personnel and organization planning; E. L. Andrews, director of manufacturing; Clark Brothers Company, Olean, New York, C. P. Clark, president, (vice president, Dresser Industries); D. K. Hutchcraft, vice president in charge of sales; F. W. Laverty, general sales manager; G. W. Probst, western regional sales manager; Dresser Equipment Company. IDECO Division, C. W. Walton, vice president (Dallas); W. O. Cook, general manager, Beaumont plant; J. J. Rosecky, general manager, Torrance plant; F. C. Ripley, Jr., sales manager; Kobe, Incorporated Division, L. T. Wold, vice president and general manager, W. F. Slater, manager of hydraulic equipment sales; J. J. Siegel, manager of perforating sales; Dresser-Stacey Company, IDECO Division (Columbus), C. E. Ponkey, chairman of the board and chief executive officer; J. R. Hayden, industrial sales manager.

Stacey Brothers Division (Cincinnati), Eric A. Flaschar, president and general manager; A. E. Harvey, executive vice president; Dresser Manufacturing Division,

Bradford, Penn., H. P. Boncher, general manager, (vice president, Dresser Industries); H. Z. Hight, sales manager; L. E. Moffatt, manager special products sales; Magnet Cove Barium Corporation, Houston, W. M. Johnson, president; G. H. Moore, sales manager; E. H. Lancaster, Jr., manager field service; Pacific Pumps, Inc., Huntington Park, Calif., A. R. Weis, president, (vice president, Dresser Industries); E. J. Weis, vice president; R. A. Dunbar, president Mid-Continent Division; G. F. Graham, secretary-treasurer Mid-Continent Division; Roots-Connersville Blower Corporation, Connersville, Ind., R. H. Owens, president and general manager; R. R. Newquist, executive vice president; D. A. Johann, general sales manager; Security Engineering Company, Whittier, Calif., Otto Hammer, president; M. B. Campbell, vice president.

Hankins, Smith in New Jobs For Byron Jackson Company

John O. Hankins

Jack Smith

John O. Hankins has been named sales representative for the Oil Tool Division, Byron Jackson Company, at Odessa, Texas. Hankins was born in Seminole, Okla., and attended school in Duncan, Okla. He joined Byron Jackson Company soon after his discharge from the U. S. Navy in April, 1946. He first worked in the engineering department in Los Angeles as a service specialist. In October, 1951, he was moved to Odessa to assist in the installation and operation of special equipment.

Jack Smith, formerly with International Cementers, Inc., is now representing Byron Jackson Company in foreign countries.

Baroid Appoints Ben F. Stiba District Sales Representative

Ben F. Stiba has been named district sales representative for Baroid Sales Division, National Lead Company, in the Corpus Christi, Texas, district. A graduate of Southwest Texas State College, Stiba joined Baroid Sales Division in 1948 as a field service engineer in the Gulf Coast division.

Ben F. Stiba

Byers Advances Rolf Griem

After being with A. M. Byers Company for 37 years, Carl G. Jensen has retired as vice president and controller, and has been succeeded by Rolf Griem, who has served as assistant controller for the past eight years.

CORPUS CHRISTI is the site of this new office and warehouse of Waukesha Sales & Service. The facilities at 4570 Baldwin Boulevard will serve Waukesha engine users in the South Texas area. R. F. Park is manager of the branch, and F. M. McCarthy is district manager.

DO YOU FURNISH HOUSING AND FEEDING FACILITIES FOR YOUR EXPLORATION TEAMS, FIELD CREWS AND OVERSEAS WORKERS ?

Interstate Bedding Company Is Your One Complete Source for All of Your Housing and Feeding Needs!

FOR SALE or FOR RENT

Interstate Bedding Co. can furnish you with the proper housing and feeding equipment for your workers—no matter how large or small a number . . . no matter where they are located . . . no matter what the climatic conditions! Interstate Bedding Co. manufactures practically all of their own equipment—assuring you of the fastest service at the lowest costs. *Interstate's equipment is available to you on a Rental basis . . . or for outright sale.*

INTERSTATE BEDDING CO. CAN SUPPLY YOU WITH:

- HOUSING—Tents: 2-man, 4-man, 8-man, and Field Tents.
- BEDDING—Comforters, Canvas Cots, Steel Cots, Blankets, Sleeping Bags, Double Deck Bunks, Sheets, Mattresses, Mattress Covers, Pillow Cases, Straw Ticks, Towels.
- FEEDING EQUIPMENT—Field Stoves, Cooking Utensils, Serving and Flat Ware, Refrigeration.
- TABLES • CHAIRS • WASH BASINS

INTERSTATE BEDDING CO. HAS SOLVED THE *NORMAL HOUSING PROBLEMS* . . . AND THE *UNUSUAL* AND *EMERGENCY HOUSING PROBLEMS* ENCOUNTERED BY MAJOR FIRMS IN YOUR INDUSTRY . . . .

Contact INTERSTATE Now . . . and every time an emergency or special housing problem arises!

24 HOUR SERVICE — WRITE • WIRE • PHONE

INTERSTATE BEDDING CO., Dept. L

1621 W. CARROLL AVE. CHICAGO 12, ILL.

Phone: CHesapeake 3-4660

STEEL Kelley PRODUCTS

Do You Need a Good New Source of Metal Stampings for Defense Contracts?

Kelley has the facilities, the know-how, and the men to do your job and to do it right. From start to finish Kelley is your one source—to help you engineer stampings, to design and make the tools, and, most important, to deliver the job to your specifications on time. Kelley cut its teeth in oilfield equipment, uses that experience to make your job better.

Write for this booklet, a complete description of Kelley, shows work done, lists machines, shows how Kelley will help you.

Kelley
MANUFACTURING CO.
4800 Clinton Drive P. O. Box 17
Houston, Texas

CALCULUS FOR PRACTICAL ENGINEERS

By DR. ALOIS CIBULKA
University of Texas, Austin, Texas

Calculus, a High Speed Tool for the Engineers.
Calculus, like the Slide Rule, is an important time saver and just like the Slide Rule, outside of its complicated appearance, there is not much to it. Anyone who studied college algebra and geometry can master practical Calculus in a short time.

Every engineer should have a working knowledge of Calculus.
There is hardly an engineering formula that did not require Calculus for its derivation.

The practical value is demonstrated by many actual engineering problems.
The integration and the differential equations will come easy to you. The whole Calculus is far more a patient juggling of the familiar algebraic formulas than a work of a genius mind. Its practical value is great in every branch of engineering. For example, in structural design: Reinforced concrete and welded steel structures are gaining ground more and more.
The rigid frames, the statically indeterminate structures are more economical and more adaptable to many different shapes. There may be other methods for their calculations, but why not use the Calculus, which you had to study anyway, for this purpose? The theory of such structures, with examples, is given in this book.

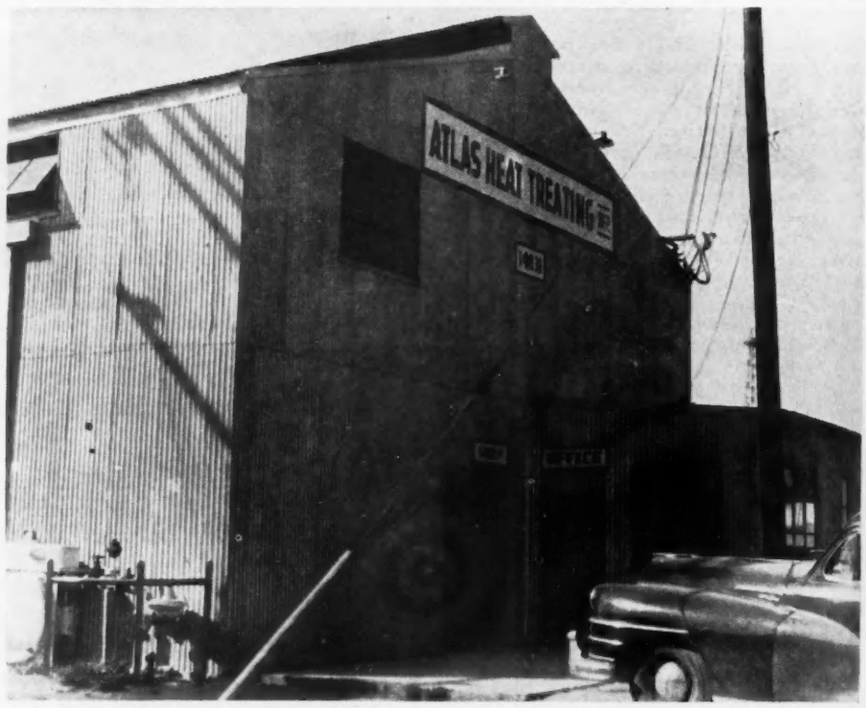
100 Pages: Size 12" x 9½"; Paper Bound. Price, $3.00

"Prices subject to change without notice"

Send Orders to the

GULF PUBLISHING COMPANY
P. O. BOX 2608 HOUSTON, TEXAS

EQUIPMENT and SERVICE SUPPLIERS' NOTES



ATLAS HEAT TREATING CORPORATION, an associate corporation of Web Wilson Oil Tools, Inc., has moved into new and larger quarters next to the plant of Web Wilson Oil Tools, Inc., in Los Angeles. Atlas Heat Treating Corporation now is equipped to do all heat treating for Web Wilson Oil Tools, Inc., and is doing heat treating work for other industries. The plant is running 24 hours a day and seven days a week; plans for additional expansion are being made. Officers of Atlas Heat Treating Corporation are: W. A. Wilson, president; E. W. Cook, vice president, and John W. Rife, secretary.

F. B. Leedy Assumes New Duties With Seismograph Service

F. B. Leedy, assistant treasurer of Seismograph Service Corporation, Tulsa, will assume the duties of A. B. Chappell, treasurer and director of the company. Leedy has been with Seismograph Service since 1934. He has worked in Trinidad, Argentina, the Bahamas and as vice president of SSC's Canadian operations. Chappell recently took a leave of absence because of bad health. Chappell joined the company in 1934 also. He served on numerous field assignments and as assistant secretary, treasurer and director.

F. B. Leedy

Milton Collum and Wes Morgan Join In New Houston Geophysical Company

A new organization in Houston is the Petroleum Geophysical Company. Partners in the firm are Milton Collum and Wes Morgan. Collum was formerly with Berg Geophysical Company of Houston. Morgan was associated with Independent Petroleum Exploration Company also in Houston.

Both men have had years of experience in the Gulf Coast region as well as Williston and Julesburg basins and Canada and Colombia. At present two seismic parties are operating in the Denver-Julesburg-Cheyenne Basin. The company is located at 5727 Kirby Drive in Houston.

Oil Well Supply Moves To New Midland Offices

West Texas district headquarters of U. S. Steel's Oil Well Supply Division, at Midland, Texas, have moved to the recently completed V-J Tower building in that city.

Transfer of the offices to new and larger quarters is Oilwell's second major step toward enlarging and improving its oil field supply service in the Midland-Odessa area since the first of the year, according to Fred F. McMurray, division president.

The new offices, consisting of a reception room and three office rooms, occupy approximately 900 square feet of floor space on the first floor of the new Midland structure.

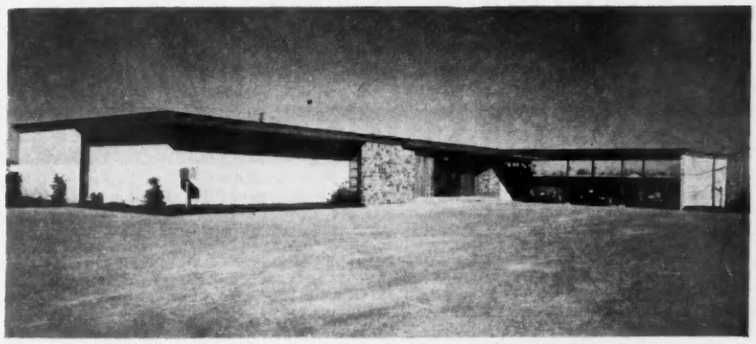
V. J. Waters, whose headquarters are at Dallas, is manager of Oilwell's central midwest area and D. O. Smith is assistant manager, in charge of the West Texas district. In addition to Smith, district office personnel includes B. J. Castle and Dayton Blivens, city representatives; Mrs. Jane Parker, receptionist, and Miss Mary Moran, secretary.

United Drilling Services Is Agent For Bowen Tool Company in Canada

Paul Bowen, president of Bowen Fishing Tool Company, has returned from Canada. While there, he completed arrangements for the United Drilling Services, 9925 77th Avenue, Edmonton, Alberta, Canada, to maintain a rental stock of Bowen fishing tools and specialties and to handle sales of Bowen tool parts.

H. E. Snelson, owner and manager of United Drilling Services, spent several years in Canada for Hughes Tool Company.

ROGERS GEOPHYSICAL COMPANY, a new firm founded by Sam Rogers, has offices in this building at 3616 West Alabama, Houston. A new $75,000 laboratory building is now under construction adjoining the office building. Rogers was formerly with Rogers-Ray, Inc., which was dissolved in 1951. A number of the crew members were employes of Rogers-Ray and have worked with Rogers for 15 years.



Service Manager and Area Personnel Assigned by Otis Pressure Control

Otis Pressure Control has appointed Carl M. Schwab as service manager for the Dallas office. Schwab's duties include

Carl M. Schwab

F. A. Rodgers

supervision of all wire line, tubing, and service operations.

D. E. Daffin has been named Gulf Coast area manager in charge of operations in South Texas, Southern Louisiana, Mississippi, and Alabama. F. A. (Jack) Rodgers, of Houston, has been appointed South Texas division manager, and Guy Gant South Texas division superintendent.

Guy Gant

D. E. Daffin

The new Gulf Coast department will centralize operations in Houston, Corpus Christi, Falfurrias, Texas, Houma, La., and Victoria, Texas.

Otis has opened a new district office in Shreveport at 1834 Jenkins Street, with Ernest Fenton as operator-in-charge. The new office is supervised by Bob L. Crain, manager of Otis' Longview office.

Schwab, University of Minnesota graduate, studied petroleum engineering at Texas A. & M. College for three years. He started with Otis as corrosion engineer, and was later in charge of the New Iberia division. Prior to his Otis assignments he was field engineer for Stanolind Oil and Gas Company. His oil field service dates back to 1934 when he began roughnecking at Sour Lake, Texas.

Eversharp Buys Climax Engine

Eversharp, Inc. has acquired the entire assets and business of Climax Engine and Pump Manufacturing Company of Clinton, Iowa. Under the trademark "Blue Streak," the Climax company manufactures pumps and engines used in drilling and pumping operations.

Recorded experience proves beyond a doubt that well pulling costs are often cut in half while oil production is sharply increased by the use of "Page" hydraulic tubing anchors. High pressure collar leaks are minimized by stopping reverse thrust on tubing threads. Excessive wear on casing, tubing and rods, common with compression anchors, is eliminated. Reversals in the pumping cycle are smoothed out, thereby increasing pump efficiency and reducing sucker rod breakage.

FASTER HANDLING, MORE EFFECTIVE CONTROL

Page type "B" tubing anchors can be assembled in the tubing string either end up. Slips cannot be set during fastest run-in, but set automatically as oil rises in the tubing, thus insuring correct setting depth without the aid of tubing manipulation. Hydraulic principle allows compensation for temperature changes and easy release by draining tubing.

Page oil tools, including tubing anchors and tubing drains, bottom hole separators and packers, tubing couplings and sucker rod on and off attachments, shut-off valves, and sampling valves are superbly engineered for ease of handling and operation, long wear, and simplicity of design. See the Composite Catalog.

PAGE OIL TOOLS, INC.
3356 LIME AVENUE
LONG BEACH 7, CALIF.

PAGE TENSION TOOLS

MID-CONTINENT DISTRIBUTORS
D&B Division — Emsco Derrick & Equipment Co. Garland, Texas
The Continental Supply Co., Inc., Dallas, Texas

WORLD OIL'S Trading Post

CLASSIFIED ADVERTISING

RATES: Regular Classified (undisplayed) set in this size type: 12 cents per word. Minimum charge, $3. Blind box address in our care counts six words. Replies forwarded without charge. **Situation wanted** ads, 6 cents per word. **Display ads,** set in suitably larger type with ruled border, $12 per column inch; situation wanted display ads, $6 per column inch. Ten percent discount for two or more insertions of same copy in consecutive issues. **All classified ads payable in advance. COPY DEADLINE:** 5th of month preceding date of issue. Send copy and checks to: **Trading Post Section, World Oil, P. O. Box 2608, Houston, Texas.**

FOR SALE

■ Well drills, spudders, rotaries, core-drills. All sizes new and used equipment. Tools, drill pipe, cable, pipe. Fishing tools rented. Everything for well drilling. Pressey & Son, Pueblo, Colorado.

■ NORTH DAKOTA AND SOUTH DAKOTA BASE MAPS. Base Maps of North Dakota and South Dakota: County outline, township and range, location of all wells, and operators names with total depths. Oil and Gas Fields. 1"—8 miles. Priced $5.00 each. COUNTY MAPS: fee ownership and lease with expiration dates. Scale 1"—4000 ft. Northwest Mapping Co. 117½ Fourth St. Bismarck, North Dakota.

■ TWO 150 horsepower F and T boilers located at Eunice, New Mexico. Makin Drilling Co., Box 131, Hobbs, New Mexico.

■ The following New Material at ½ Retail Price:
8 6" FE 90° Ser. 600 Cast Steel Base Elbows
4 8" FE 90° Ser. 400 Cast Steel Base Elbows
4 10" FE 90° Ser. 300 Cast Steel Base Elbows
If interested contact Mr. Bert Rogers, Texon, Texas..

■ Well Drilling Spudders and Rotaries, bought and sold. Immediate delivery in most cases. Specify your requirements. Contact Francisco Gonzales, Baker Export Co. Box 1128, Pecos, Texas.

■ 1400 feet or less 3½" EUE or 2⅞" EUE drill pipe, new or good used. One 30 foot 4¾" drill collar, new or good used. Have PAD authorization for pipe. Box 41-W, WORLD OIL, P. O. Box 2608, Houston, Texas.

■ For Sale: One 125 H.P. Allis-Chalmers 1170 RPM 2200 Volt, 31 Ampere, Type A.R. code F, 3 phase, 60 cycle, 24 hour, 40 degree rise induction electric motor. Never used. In original crate, priced at $1500.00. Located Cushing Refinery, Cushing, Oklahoma. Contact Huitt, Deep Rock Oil Corporation, Box 1051, Tulsa, Oklahoma.

■ PERMIAN BASIN WILDCAT MAP OF WEST TEXAS & SE NEW MEXICO. Scale 1"—64,000'. Just like a newspaper—a quick glance and you know what's happening in the Permian Basin. Revised monthly. Single copy $3.50. Midland Map Company, Box 1211, Midland, Texas.

■ FOR SALE: Westcott, Foxboro and Emco Gas Meters, Geo. R. Milner, Box 124, Okmulgee, Oklahoma.

■ FOR SALE: Fox Paraffin Solvent Formula and Trademark. Must sell due to death of husband and son. Contact Mrs. G. E. Fox, 224½ West 8th, Bristow, Oklahoma.

■ FOR SALE—Wyoming Government Land Leases. Natrona County, Twps. 31-32-34-37-38, Rngs. 78-86; Weston County, Twp. 42, Rng. 60; Johnson County, Twp. 41, Rng. 80; Fremont County, Twp. 39, Rng. 92. ACTIVE AREAS. Write Box 198, Casper, Wyoming.

HELP WANTED

PETROLEUM ENGINEERS

Major Oil Company has openings for a number of Petroleum Engineers for service in South America & Middle East. Requirements: B.S. degree in P.E., M.E. or Chem. E.; to 3 yrs Experience.

GULF OIL CORPORATION
Foreign Production Div.
P. O. Box 35, N. Y. 4, N. Y.

■ Experienced surveyors for foreign service with gravity crews. Top salary, subsistence, travel expenses. Our personnel have knowledge of this ad. Apply Box 42-W, c/o World Oil, P. O. Box 2608, Houston, Texas.

■ Experienced gravity party chief-supervisor for foreign service. Top salary and expense allowance. Family can accompany. Our personnel have been notified. Apply Box 43-W, c/o World Oil, P. O. Box 2608, Houston, Texas.

■ Wanted: Experienced, reliable Observer. Must have excellent references. Top money. Location in Kansas or Nebraska. Communications confidential. Central Exploration Co., Inc., P. O. Box 3005, Capitol Station, Oklahoma City, Oklahoma.

■ Wanted: Interpreter. Minimum five years' experience. Must have excellent references. Permanent location. Top money. Communications confidential. Central Exploration Co., Inc., P. O. Box 3005, Capitol Station, Oklahoma City, Oklahoma.

WANTED TO BUY

■ Wanted to buy by Eastern manufacturer of oil country equipment: Small machine shop, 2,500 to 5,000 sq. ft. floor space. Machine tolerances required .010". Write Box Number 38w, c/o WORLD OIL, P. O. Box 2608, Houston, Texas.

BUSINESS OPPORTUNITIES

■ WE WILL BUY Producing Oil Royalties. Send Particulars. Standard Security Co., 111 Broadway, New York 6, New York.

■ Will cooperate with you with years experience with geological conditions for locating the most desirable locations for drilling for gas and oil on structure where gas and oil is trapped regardless area located. Address Box 44-W, c/o World Oil, P. O. Box 2608, Houston, Texas.

Thomas Hydraulic Controls Names Joe Tucker President

Joe Tucker has been named president and general manager of Thomas Hydraulic Speed Controls, Inc., Wichita, Kansas. He will direct expanded engineering production and sales of Thomas variable speed hydraulic drives.

Tucker was assistant general manager and later executive vice president of Massey-Harris Company, Racine, Wisconsin, from 1943 to 1949. An American citizen, he was decorated as an officer of the British Empire for services during World War II as director of the Canadian division of the War Production Board.

LEASES

■ Write John E. Welton, Bowling Green, Ohio, 239 S. Prospect Street, for late data on 700 acres near new well in Gray Co., Panhandle, Texas.

■ For Sale: Oil and Gas Leases adjoining producing leases, also wildcat leases, drilling propositions and small producing properties; all in shallow territory. W. P. Harley, Bowling Green, Kentucky.

■ Offer, Gas Production in Kansas Hugoton Gas Field. $5,700,000.00 reserves, based on 501b abandonment. Price $1,100,000.00. P. O. Box 733, Topeka, Kansas.

■ AVAILABLE for lease or exploration NE/4 Sec. 1 Blk A-26 PSL Gaines County, Texas. Ramsey Oil Corporation, 1920 Speedway, Austin, Texas.

■ ATTENTION, Wyoming-Montana Land Men —12,000 acres fee land joining large company block Wheatland County, Montana, in 8 and 9 N. and 12 E., also 7500 acres Gov't. leases located southwest Hamilton Dome, Hot Springs County, Wyoming, 44 N. 98 W. And 12,000 acres Converse County, Wyoming, S. A. Harrison, Thermopolis, Wyoming.

■ For Lease or Drilling Contract, 800 acres in Williston Basin, NE Montana, 18 miles from Murphy discovery. Write or contact M. J. Schwinden, Wolf Point, Montana.

DECALS

TRUCK LETTERING AND TRADEMARK decals made for your trucks. Easy to apply, uniform, distinctive, economical for small or large needs. Write for Catalog. Mathews Company, 827 S. Harvey, Oak Park, Ill.

PRINTED FORMS FROM STOCK

Immediate delivery of producing and pipe line forms made from our complete line . . . Write for completely illustrated catalog.

GULF PUBLISHING CO.
P. O. Box 2608 Houston 1, Texas

SITUATION WANTED

Drilling contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box 94-W, WORLD OIL, Houston 1, Texas.

■ Geologist—10 years' experience Gulf Coast desires change. Now District Geologist for Major Oil Company in San Antonio, will relocate. Write Box 45-W, c/o World Oil, P. O. Box 2608, Houston, Texas.

New Books, Maps and Movies

AMERICAN PIPE LINES, by George S. Wolbert, Jr. University of Oklahoma Press, Norman, Okla. $3.50.

Industrial structure, economic status and legal implications of America's oil and gas pipe lines are presented in this new book in a manner calculated to clarify the intricacies of the unique industry. It is directed especially toward those who (usually through ignorance) demand divorcement of pipe lines from major integrated oil companies.

"Claims and counter-claims, structural peculiarities of the pipe line industry, ignorance of the physical and economic necessities of underground transportation of oil, and a crazy quilt of regulatory laws have all served to obscure the facts essential to an intelligent appraisal of these demands," the publisher says. The author's approach to analyzing the salient factors involved in the economic and regulatory status of pipe lines is both scholarly and straightforward.

FUEL AND POWER IN CAPTIVE MIDDLE EUROPE, by Jan Wszelaki. Mid-European Studies Center of the National Committee for a Free Europe, Inc., 110 West 57th Street, New York.

Taking the Communist plans and proclaimed achievements for oil and other power sources, Wszelaki analyzes the possibilities for fulfillment or non-fulfillment of the immense production goals set for the Iron Curtain countries of Middle Europe. The author, a former member of the Polish diplomatic service and a specialist in economic affairs, has used sources and materials not normally available in the U. S. in forming his appraisal.

T. A. KOLSTER TECHNICAL DICTIONARY. T. A. Kolster, Apartado 889, Caracas, Venezuela. $5 U.S.

This English-Spanish and Spanish-English dictionary contains mechanical, geological, engineering, legal and accounting words, terms and expressions common to the petroleum industry.

ROCKY MOUNTAIN OIL AND GAS OPERATIONS — 1951. Petroleum Information, Continental Oil Building, Denver.

Where more than $30 million in geophysical work was expended during 1951 in the Rocky Mountain region is explained in this 22nd annual resume. The book is a 265-page review of activity during the greatest year from the standpoint of oil exploration and development in the history of the Rocky Mountain region.

The resume is made up of two principal sections. A statistical section lists each of approximately 1700 wells drilled in the 11-state area last year by state, area, operator, location, total depth and initial production of oil or gas. Included in the statistical section is a detailed report on crude oil production by fields. The report on production in each field gives location, number of wells, year of discovery, average gravity, production for each year since discovery and total production.

THE FINANCIAL POST SURVEY OF OILS. MacLean-Hunter Publishing Company, 481 University Avenue, Toronto 2, Canada. $2 U.S.

An investment reference book compiled by a Canadian business newspaper, the new 1952 edition reviews the growth of the Canadian oil industry and predicts still higher production backed by still greater reserves.

Assurance of further expansion of the western oil industry is seen in the new Trans-Mountain pipe line to be built to the West Coast from Edmonton; discovery of light crude all the way from the Peace River area of British Columbia to the Roseray district of southwestern Saskatchewan; and numerous recent discoveries of light crude in Alberta, including Wizard Lake, Drumheller, New Norway and Armena.

The survey reviews 600 active western oil companies, with data on production, earnings, dividends, acreage interest and management. A five-year price range of oil stock movements is also listed. Maps show drilling activity.

Eagle-Picher Lead Wool means

NO MORE BOTTOM WATER

Keep bottom water out of your wells—and prevent costly shutdowns—by tamping Eagle-Picher Lead Wool in the hole. A watertight plug that seals every crack and crevice is made by this finely stranded, flexible metallic wool. Shipped in convenient 50-lb. sacks . . . easy to spot in special cartridge-shaped Eagle-Picher Wire Containers sized to fit all casings. Order through your jobber.

3 Eagle-Picher Bearing Metals that meet most requirements

1. **Dreadnaught**—for extreme speed and heavy-duty conditions.
2. **Outlasta**—for medium speed and average-load conditions.
3. **Durable**—for low speed and light-duty conditions.

THE EAGLE-PICHER SALES COMPANY

Since 1843 • Metallic Products Division
General Office, Box 777, East Chicago, Indiana
Cincinnati • Kansas City • East St. Louis • Dallas • Houston
MEMBER: LEAD INDUSTRIES ASSOCIATION

EAGLE EP PICHER

FOR PUMPING SMALL WELLS

Operators Prefer

O'BANNON BABY RED ROD PUMPS

Here's Why:

★ Because of its small displacement (1" bore) the Baby Red Rod Pump permits small wells to be pumped at about the same rate fluid enters the well. This usually results in increased production because fluid flows freely into the well at all times.

★ Rods and surface equipment last longer, because the load on them is less than with larger bore pumps.

★ Pumps stands up well because of rugged construction. Plunger is a strong, one-piece steel tube which is sealed by soft packing positioned around the outside surface. Cro-Lay plungers are used where sand causes rapid wear of plain steel.

★ Seal automatically adjusts to well depth. Baby Reds work as well at 5000′ as at 500′.

★ Easy and inexpensive to repair. Servicing requires less skilled labor and less critical materials than do most other types of pumps.

FOUR TYPES

Traveling Barrel (illustrated), Stationary Barrel with top hold-down, Stationary Barrel with bottom hold-down, and Stationary Barrel with bottom hold-down and bottom discharge valve—a new type best for wells where sand and gas cause trouble.

Ask your O'Bannon representative to show you a Baby Red and you will see why so many operators prefer them.

Sold by Supply Stores

WALTER O'BANNON COMPANY

TULSA 1, OKLAHOMA

SQUEAKS from the BULLWHEEL

Could Be

Miss Gabber, at the door: "There's something I wanted to say before going, but I just can't recall it."

Small son of hostess: "Maybe it was 'goodbye.' "

Let's Face It

The reason barbers are charging more for shaves these days, is because high taxes and stuff have made his customers' faces longer.

Inflation Pains

Considering today's prices, to feel only "like a million dollars" would be practically admitting that you're feeling mighty low.

Bank Call

"Our bank has just gone through a reorganization."

"What was the matter?"

"Nothing, except we discovered we had more vice presidents than depositors."

Tomorrow's Another Day

Australian (entering hospital): "Ullow, Bill."

"Ullow, Steve."

"Come in to die?"

"No, yesterdye."

Two Step

The country dance floor was jammed and after one number a gallant youth said to a young lady beside him, "Thanks so much for the dance."

"Dance? Dance?" she queried aghast. "Why I was just pushing through the crowd to reach the refreshment stand."

What Would You Have Done?

A young business man, a deacon in his local church, while in New York on business was to purchase a new sign to be hung in front of the church. He copied the motto and the dimensions, but when he got to New York discovered he had left the paper behind.

He wired his wife: "Send motto and dimensions."

An hour later the reply came in and the new girl, who had just come on duty, read it and fainted. The message read:

"Unto Us a Child Is Born, 6 feet long and 2 feet wide."

Ask a Silly Question

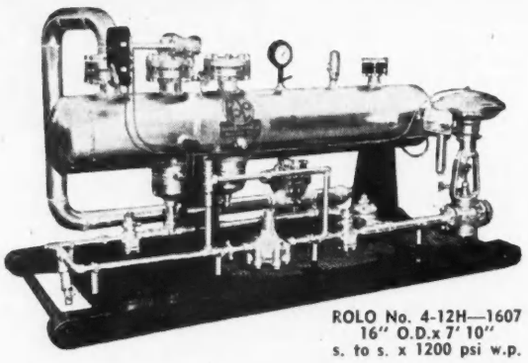
Sailor (at stage door): "Is the hula dancer in her dressing room?"

Watchman: "Son, she's 'round at the rear."

Sailor: "Answer my question."

ROLO WELLCHECKERS

Permanent and Portable Separators For Metering Oil and Gas



ROLO No. 4-12H—1607
16" O.D.x 7' 10"
s. to s. x 1200 psi w.p.

Made in all sizes and working pressures to suit any operation, Rolo Wellcheckers enable the operator to check his individual well production daily, weekly, monthly, or as required. Used in making drill stem tests, potential tests, periodic production tests, gas-oil ratio tests, marginal well tests, etc. Shipped completely piped and ready to operate. Write for illustrated Bulletin No. 195-W or see Composite Catalog.

Crude Oil Metering Specialists

ROLO MANUFACTURING COMPANY

2510 South Blvd., Houston 6, Texas

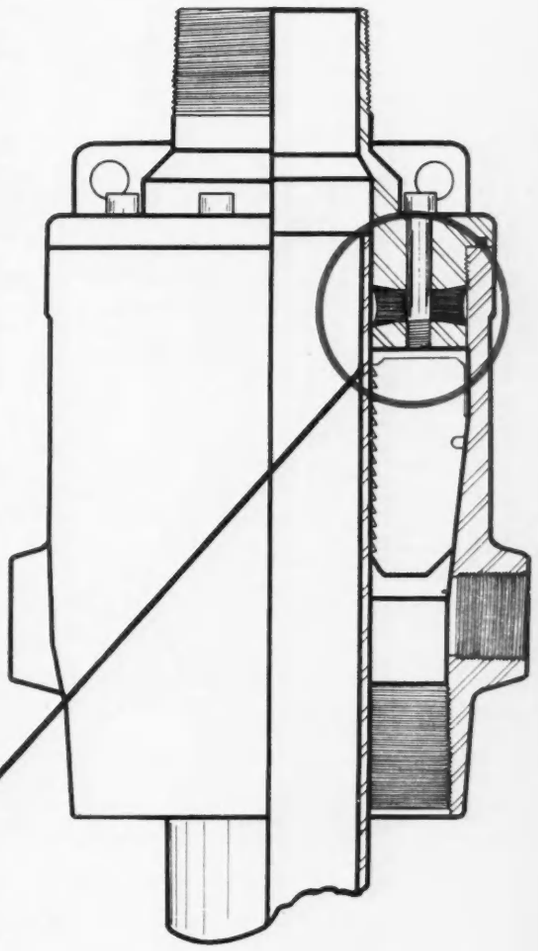
BRANCHES: Corpus Christi, Midland, Kilgore, Tulsa, New Orleans, Los Angeles, Casper, Calgary, (Alta).
EXPORT OFFICE: R. S. Stokvis & Sons, Inc., 17 Battery Place, New York, N. Y.

HINDERLITER

SIAMESE HOOK UP

Now Hinderliter offers you all the advantages of a compact casing head and tubing head in *one* amazing new *hook-up.* This hook-up is one of the greatest time and money savers ever introduced in well head control.

It was named by one of the production superintendents who field tested it. He was so pleased that he came back to Hinderliter for another of those "Siamese" hook-ups. The illustration at the right shows why he called it a "Siamese." This revolutionary new arrangement developed by Hinderliter makes *one* compact *hook-up* of the casing head and the tubing head.



JUST CHECK ALL THESE FEATURES:

- Completely eliminates the nippling-up process. Cut off the casing, install the "Siamese" and connect the tubing head. Saves hours of valuable rig time.
- Packing can be adjusted at *any* time from the *outside* without disturbing *any* element of the hook-up.
- New packing ring design, exclusive with Hinderliter, provides a more effective seal at less pressure application than ever before.
- "Siamese" element is completely unitized. No possibility of lost parts or improper installation which might cause costly leaks.

* *Drilling flange is available for use with Hinderliter YLS Casing Head for connection with a blowout preventer.*

HINDERLITER
PORTER
EQUIPMENT

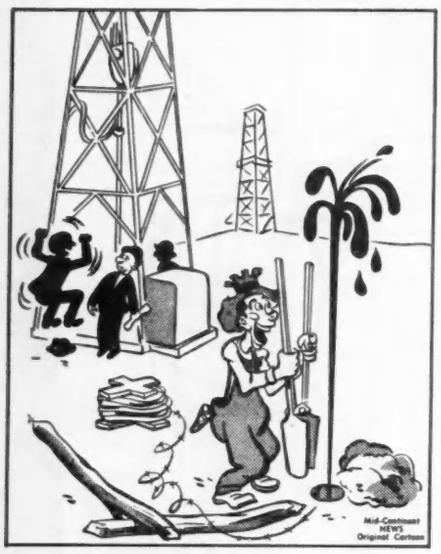
HINDERLITER TOOL COMPANY DIVISION

H. K. PORTER COMPANY, INC.

DRAWER 2650 TULSA 1, OKLAHOMA

Mid-Continent NEWS

OIL IS WHERE YOU FIND IT! . . .



"$%•&(*%?!★ 7000 feet and still no damned oil!"

. . . and so is humor!

"I don't care how your plans read! Turn the damn thing over!"

MID-CONTINENT Supply Company

General Offices Mid-Continent Bldg. FORT WORTH, TEXAS

SQUEAKS FROM THE BULLWHEEL

'A' For Today

Teacher: "Tommy, spell the word neighbor."

Tommy: "N-e-i-g-h-b-o-r."

Teacher: "That's right. Now, Tommy, can you tell me what a neighbor is?"

Tommy: "Yes, ma'm. It's a woman that borrows things."

As You Like It

"Every short story," said the professor in journalism to his class, "should have reference to the Deity, a touch of royalty and some mention of sex."

The next day an earnest student turned in his first short story.

"My God, said the princess, take your hand off my knee!"

And Knock

"Well, old boy," said the guest to his host who had just moved into a new home, "how do you find it here?"

"Upstairs. First door to the right."

Man-To-Man

A sharp tongued lassy noticed a "friend" walking down the street with two men. "One's her hubby," remarked the catty lady. "The other's her hobby."

Faces and Figures

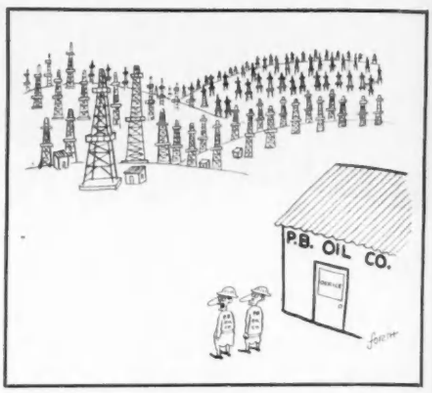
"Yesterday I met a cutie that I used to date ten years ago!"

"Has she kept her girlish figure?"

"Kept it? Man, she doubled it!"

Verse-Atile

I don't like women—they cheat and lie,
They prey on us males till the day we die.
They tease us and vex us, and drive us to sin . . .
Sa-a-y, lookit that blonde who just walked in!



"We might as well give up—there just ain't any oil in this territory."

Signs of Our Time

Sign in grocery: "Be polite to clerks. They are harder to get than customers."

Carrying Things Too Fur

"Where did you get that fur coat?"

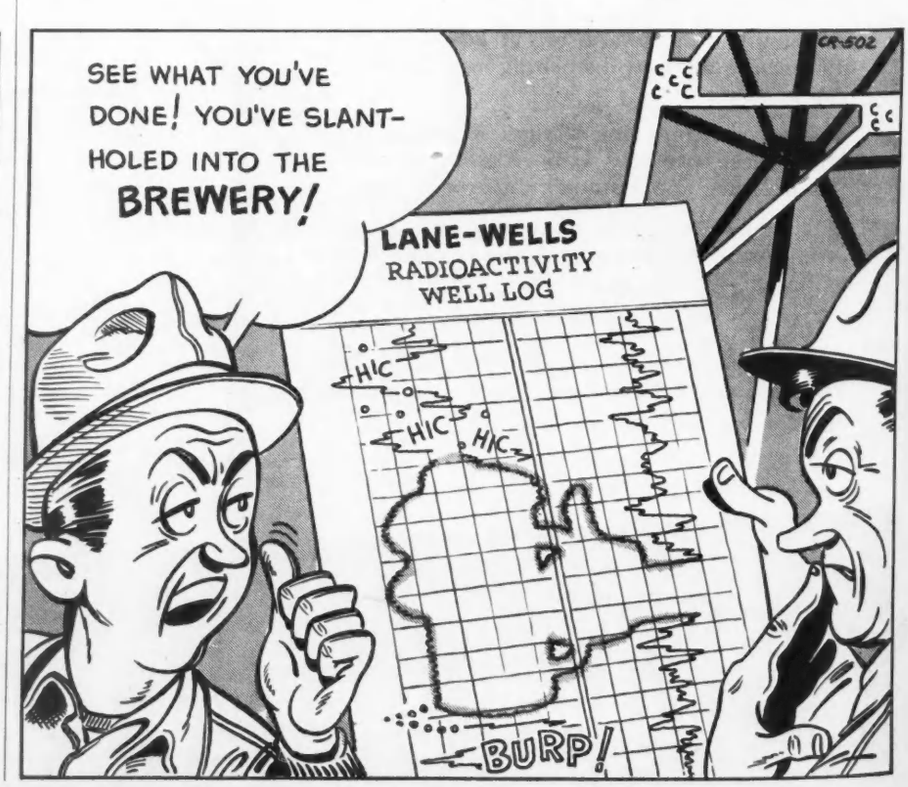
"Just a piece of good luck; George fell and broke his leg and the insurance company sent us the money."

Oh, Doctor!

A Hollywood producer called a staff conference to discuss a story called, "The Optimist." "Gentlemen," he said, "we'll have to change this title to something simpler. We all know what an optimist is, but how many of the public will know that the hero's an eye doctor?"

. . . And to the Point

When a drilling contractor, known locally for his liking for quality in everything, saw that his secretary had suddenly falsi-fied her normally flat bosom, he remarked to a friend, "It's a sham dame."



What's NEW

In Perforating, Testing, and Fishing Tool Services

McCULLOUGH®
NEW SERVICES • NEW TOOLS
NEW WAYS OF DOING THINGS

Latest News About New Tools, Techniques and Services

RESULTS and RECORDS

RESULTS SELECTED FROM RECENT McCULLOUGH FIELD REPORTS

DEPTH OF OPERATION	McCULLOUGH TOOL and RESULTS	McCULLOUGH BRANCH
1. 16,115 feet	New Radiation Well Logger—Gamma Ray and Neutron; Bridging Plug; and Glass Jet Perforator with Steel Strip Carrier. On test after obtaining world's deepest production.	Casper, Wyoming
2. 13,211 feet	Mechanical Long Knife Internal Cutter. Size: 2¼", run in on 1¼" tubing. Three cuts made, the lowest one at 13,211 feet.	Ventura, California
3. 13,005 feet	5" Jet Casing Cutter. 18# N-80 casing. Temperature over 277°F. 13,005 feet of casing recovered.	Casper, Wyoming
4. 12,500 feet	Bullet Type Gun Perforator (Burrless Bullets). One string of cemented casing—5½". 1560 B/D potential.	Hobbs, New Mexico
5. 12,492 feet	Radiation Well Logger and Bullet Type Gun Perforator (Burrless Bullets). One string of 6⅝" 32# casing. Engineers reported a very good well, production not released.	New Iberia, Louisiana
6. 12,265 feet	Glass Jet Perforator with Steel Strip Carrier. One string of 5½" cemented casing. 3100 B/D.	Odessa, Texas
7. 11,495 feet	Bottom Hole Jet Cutter. Temperature 280°F. Eliminated junk in bottom of the well.	Bakersfield, California
8. 10,200 feet	10¾" Jet Casing Cutter. 51# N-80 cemented casing. 10,200 feet of casing recovered.	Casper, Wyoming
9. 10,000 feet	Magna-Tector and String Shot Back-Off. Stuck drill pipe recovered without damage.	Ventura, California

10. AND DAY AFTER DAY McCullough tools continue to get the results you want—more efficiently. For example: The McCullough Glass Jet Perforator helped bring in the first successful oil well in British Columbia recently, after all other methods had failed. And in the U.S.A., 7752 bullets were shot in one well at one time—in only 73 hours—another McCullough world record!

STRONGER TOOLS MEAN MORE OIL WITH LESS RIG TIME. McCullough tools' greater strength, proved in the world's deepest wells, bring you results that you can measure! Yes, and these measurements—in production and rig time—will give you MORE of what you want!

Call your McCullough Service Engineer in your area. He is there for only one purpose—to help you solve your problems as quickly as possible. There is no obligation on your part, so . . .

CALL YOUR McCULLOUGH SERVICE ENGINEER TODAY

PERFORATING, TESTING AND FISHING SERVICE ANYWHERE—ANYTIME!

McCULLOUGH TOOL COMPANY

5820 South Alameda Street, Los Angeles 58, California
405 McCarty Street (P. O. Box 2575) • Houston, Texas

EXPORT OFFICE: Los Angeles, California
CANADA: Edmonton, Alberta; Calgary, Alberta; Regina, Saskatchewan
VENEZUELA: United Oilwell Service Co., S.A.; Caracas, Anaco, Maracaibo

SERVICE LOCATIONS: **TEXAS:** Houston, Snyder, Alice, Cisco, Corpus Christi, McAllen, Odessa, Tyler, San Angelo, Victoria, Wichita Falls. **OKLAHOMA:** Oklahoma City, Guymon, Healdton. **MISSISSIPPI:** Laurel. **NEW MEXICO:** Hobbs. **KANSAS:** Great Bend. **WYOMING:** Casper. **CALIFORNIA:** Los Angeles, Avenal, Bakersfield, Ventura. **LOUISIANA:** Houma, Lake Charles, New Iberia, Shreveport. **COLORADO:** Sterling. **NORTH DAKOTA:** Williston. **UTAH:** Vernal.

★ WELL LOGGING ★
Williston Basin — Rocky Mts.
West Texas — New Mexico
Foreign
Complete Field Laboratories
P. O. Box 1992
Phones: 2-8996 2-9934 2-6185 2-8355
Geological Well Service Co.
(GEO-SERVICE)
WHITE BLDG., ABILENE, TEXAS
Brochure and References on Request

CONTACT YOUR FAVORITE SUPPLY HOUSE
STANDARDIZE ON
PARMACO CASING AND DRIVE SHOES
•
SIZED CORRECTLY
•
PARKERSBURG MACHINE CO. PARMACO PARKERSBURG, W. VA., U.S.A.
The House of Courteous Service

Standco
NO-SMOKE
STANDCO BRAKE LINING
is the driller's best friend because it makes the easiest brake known and "feeds off evenly while drilling." It never scores brake rims. See pages 4739-4750, Composite Catalog.
Standco Brake Lining Co.
HOUSTON

HOUSTON LABORATORIES
Analytical and Consulting Chemists
Hydrocarbon Gas Analyses, Reservoir Equilibria Studies for Crude and Condensate Well, Waters, Brines, Corrosion and Industrial Analyses.
Phone CApitol 1319, Box 132, Houston, Texas

PRINTED FORMS FROM STOCK
Immediate delivery of producing and pipe line forms made from our complete line . . . Write for completely illustrated catalog.
GULF PUBLISHING CO.
P. O. Box 2608 Houston 1, Texas

SQUEAKS FROM THE BULLWHEEL

Look Out Below

Judge: "You're charged with throwing your mother-in-law out of a ten-story window. Guilty or not guilty?"

Young Man: "Guilty, your Honor. I did it without thinking."

Judge: "That's no excuse. You might have hit somebody on the head. I fine you $5."

Definitions

A tomahawk is what when you see someone who's been scalped there's been an Indian with.

But No Chaser

Nightmare: "There I was in the middle of the Sahara, dying for a drink and all I could find was sand-bars."

Trapped

Talker (boring company with his tales): And while wandering around the native village, I spotted a leopard.

Listener: Now I know he's a liar. Leopards come that way.

Information Please

Three deaf men were on a train bound for London. "What station is this?" asked one gentleman at a stop.

"Wembley," answered the guard.

"Heavens!" said the second. "I thought it was Thursday!"

"So am I," exclaimed the third. "Let's all have a drink."

Feminine Strategy

"You say you met your wife at a night club; rather romantic wasn't it?"

"Well, not really; I wasn't expecting her to be there."

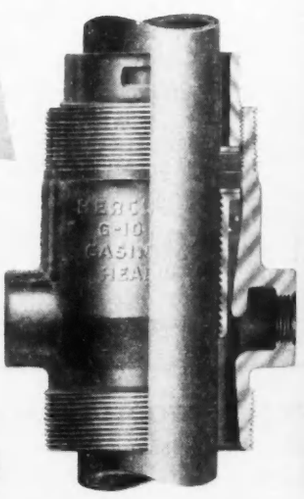
A Will And Away

Sergeant: "When I say 'Fire' I want all of you to fire at will."

Just then a recruit leaped to his feet and disappeared like a scared rabbit.

Sarge: "Who was that?"

Another Recruit: "That was Will."

STANDARD of the INDUSTRY...
"Originators of overhead-packed wellhead equipment"
The next time you order, be sure to specify HERCULES G-10 CASING HEADS—standard of the industry for 26 years. Made from electric cast steel, with overhead packing arrangement and built to stand 3,000 pounds test pressure. Steps are provided to support from 2" tubing up to and including 7" casing. Will safely support 10,000 feet of 7" O.D. Casing.
Write for Bulletin No. 310-G10
SOLD AT ALL SUPPLY STORES

HERCULES TOOL TULSA
HERCULES TOOL COMPANY
Manufacturers of Oil Field Equipment
General Office and Plant: 17th and Phoenix P. O. Box 286
TULSA, OKLAHOMA
Telephone 3-1186 Cable Address "HERTOCO"
EXPORT REPRESENTATIVES: OIL FIELD EQUIPMENT CO., INC.
T. E. WARD, President
30 Church St., New York 7, N. Y.